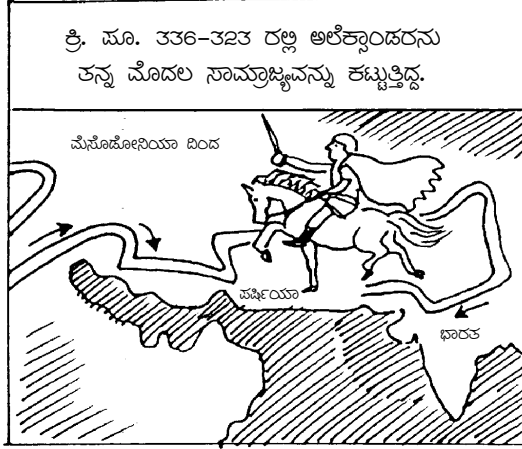
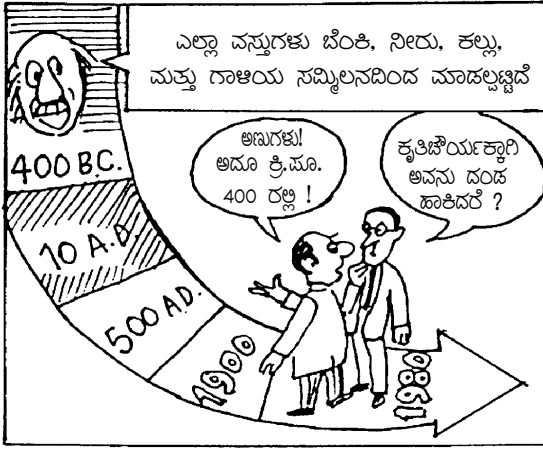
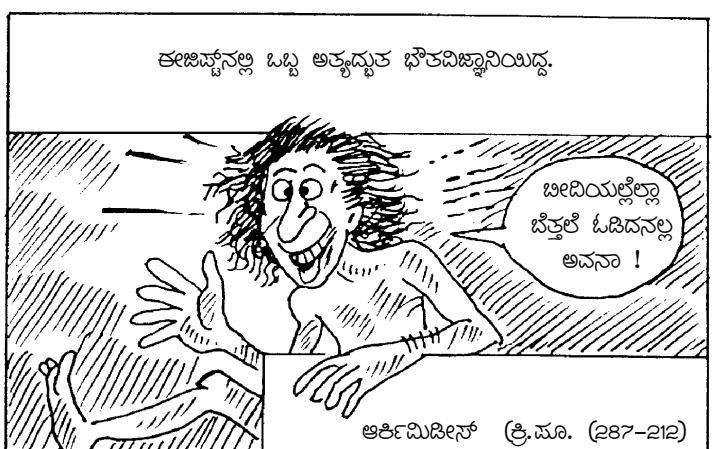
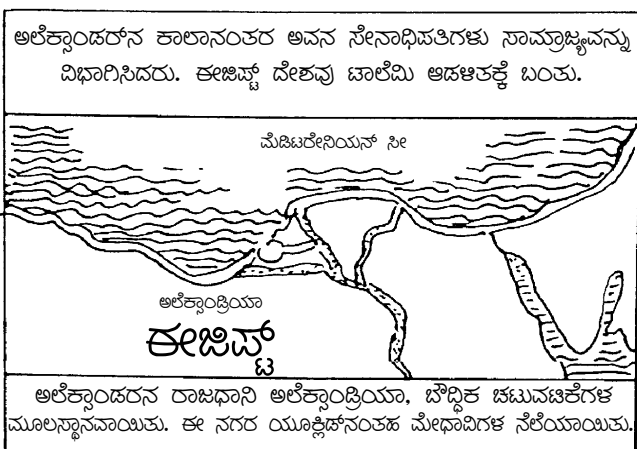
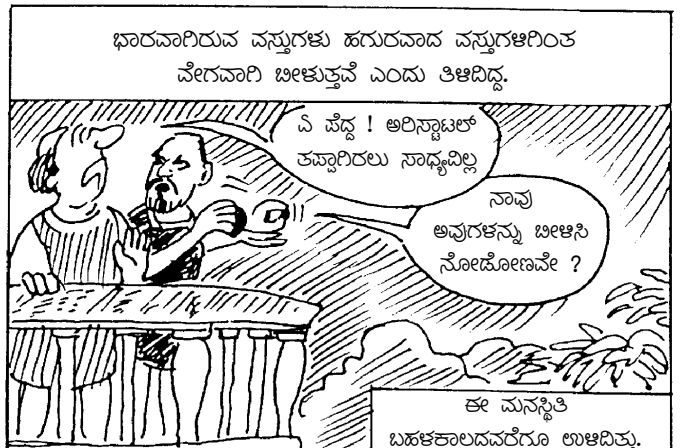
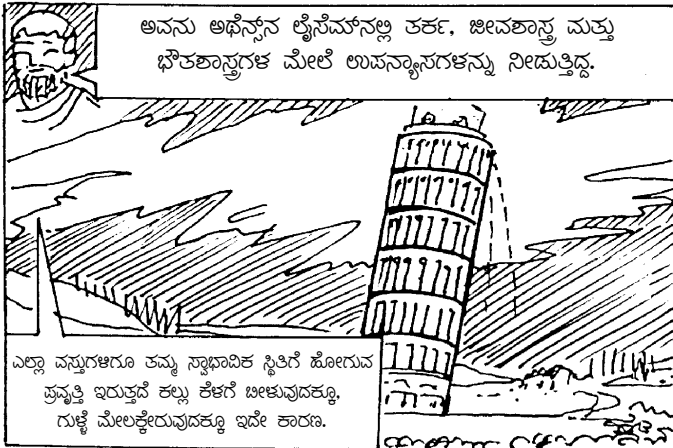
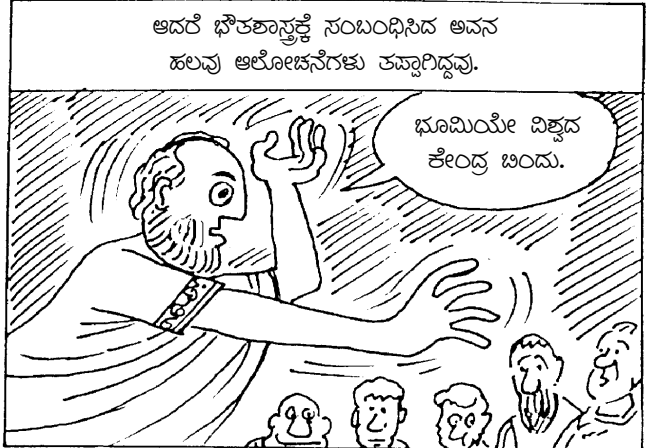
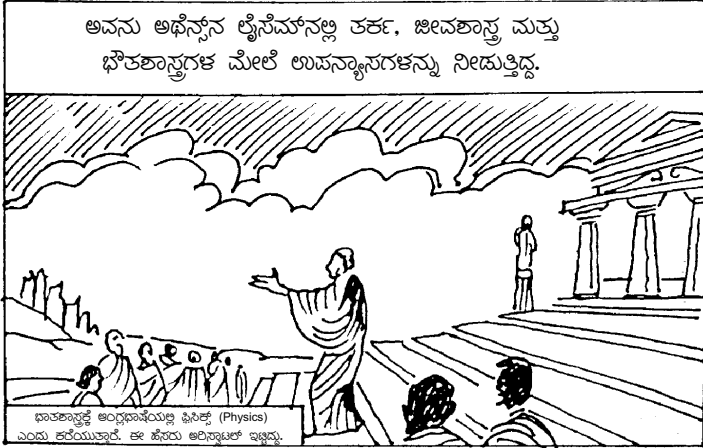
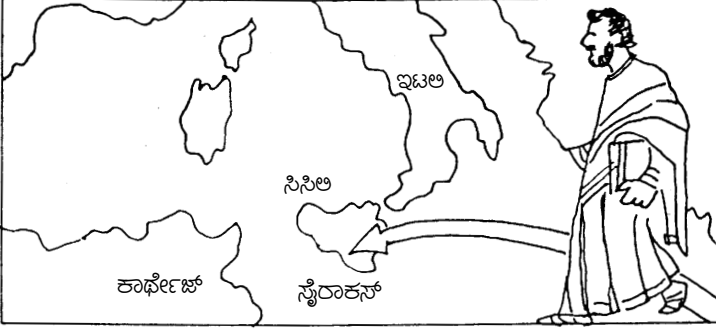




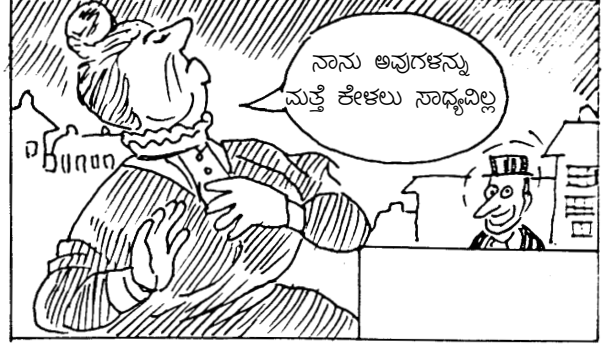
ఇదో నమయదల్లి అవన గురు అరిస్టాటల్ (క్రి.పూ.384-322) ఓండు జ్ఞాన సామ్రాజ్యవన్ను కట్టున ప్రయత్నదల్లిడ్డ.



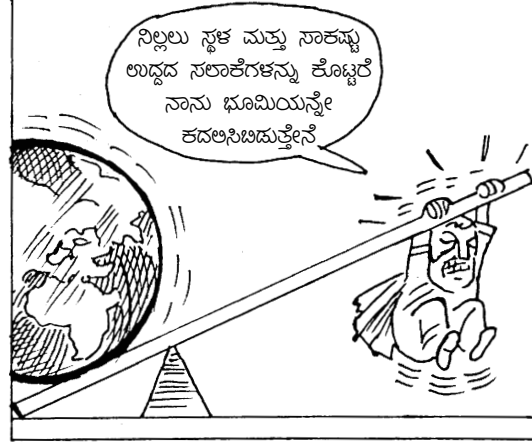
ಅರ್ಕಿಮಿಡೀಸ್ ಅಲೆಕ್ಸಾಂಡ್ರಿಯಾದಲ್ಲಿ ವಿದ್ಯಾಭ್ಯಾಸ ಮುಗಿಸಿ
ಅವನ ಸ್ವಸ್ಥಕವಾದ ಸೈರಾಕಾಸ್‌ನ ರಾಜ ಡೈರಾನ್‌ನ ಆಸ್ಥಾನದಲ್ಲಿದ್ದ



ಅವನ ತೇಲುವ ವಸ್ತುಗಳ ನಿಯಮ ಮತ್ತು
ಯುರೇಕಾ ಕಥೆಗಳು ನಿಮಗೆಲ್ಲರಿಗೂ ಗೊತ್ತೇ ಇದೆ.

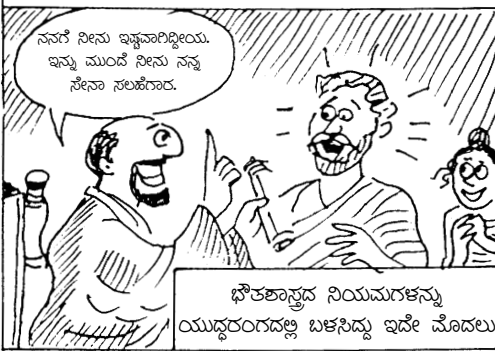


ಜಡವಸ್ತುಗಳ ನಿಯಮವನ್ನು ಮೊದಲಿಗೆ ಪ್ರತಿಪಾದಿಸಿದವನು
ಅರ್ಕಿಮಿಡೀಸ್ ಅವನು ಸಮಕೋನ ತ್ರಿಕೋನ ಬಗ್ಗೆ ಬರೆದ ಪುಸ್ತಕದಲ್ಲಿ
ಈ ನಿಯಮಗಳನ್ನು ಬರೆದಿದ್ದನು



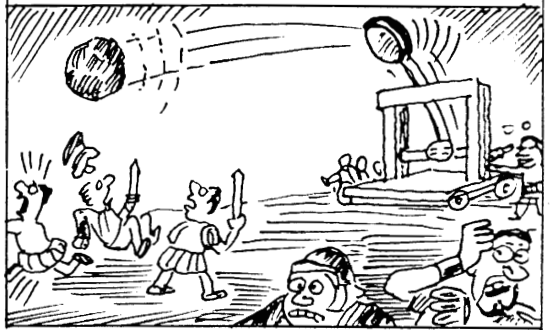
ಇದು
ಜಾಸ್ತಿಯಾಯಿತು.
ಒಂದು ಹಡಗನ್ನು
ಕದಲಿಸುವುದು
ಹೇಗೆಂದು ಹೇಳು
ಸಾಕು ?

ಅರ್ಕಿಮಿಡೀಸ್‌ನು ರಾಣಿ ಮತ್ತು ಸನ್ಯಾಸಿಗಳ ಸಹಾಯದಿಂದ
ನಿಜವಾಗಿಯೂ ಹಡಗನ್ನು ದಂಡೆಗೆ ತಂದನೆಂದು ಪ್ರತೀತಿಯಿದೆ

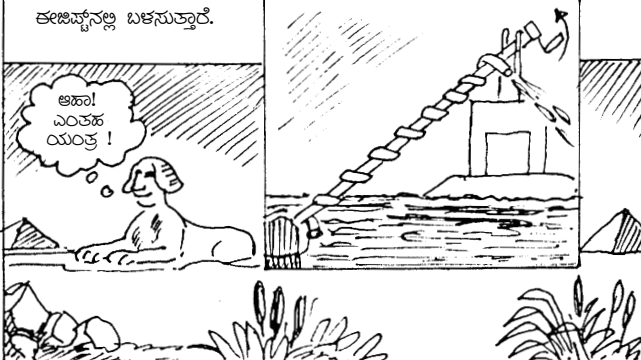


ಡೈರಾನ್‌ನ ನಂತರ
ಅವನ ಮೊಮ್ಮಗ
ಡೈರೋನೀಮಸ್ ರಾಜನಾದನು.
ಎರಡನೇ ಪುನಿಕ ಯುದ್ಧದಲ್ಲಿ
ಹನ್ನೆರಡು ನಾಯಕತ್ವದ ಕಾರ್ಥೇಜ್
ಸೈನ್ಯದ ಯಶಸ್ಸನ್ನು ಕಂಡು
ಬೆರಗಾದನು. ಅಲ್ಲದೇ
ರೋಮ್ ಪ್ರಾಂತ್ಯದೊಂದಿಗೆ
ಮಾಡಿಕೊಂಡಿದ್ದ
ಒಪ್ಪಂದವನ್ನು ಮುರಿದು ಕಾರ್ಥೇಜ್
ಜೊತೆ ನೇರಿಕೊಂಡನು
ಇದರಿಂದ ಕುಸಿತದೊಂದ
ರೋಮನರು ಸೈರಾಕಾಸ್
ನಗರಕ್ಕೆ ಮುತ್ತಿಗೆ ಹಾಕಿದರು.

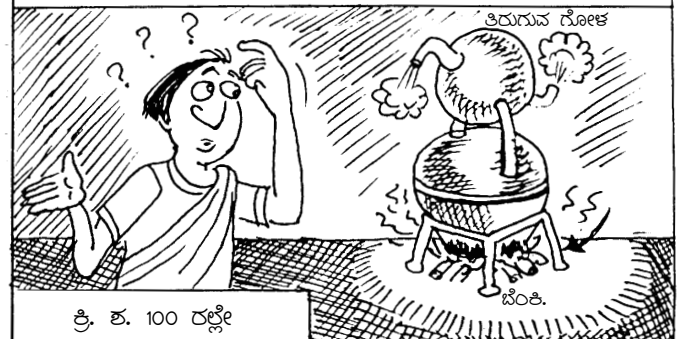
ರೋಮನ್ ಸೇನಾಧಿಪತಿ ಮರ್ಸೆಲ್ಲಸ್‌ನು ಸೈರಾಕಾಸ್ ನಗರವನ್ನು
ಪ್ರವೇಶಿಸಲು ಎರಡು ವರ್ಷಕ್ಕೂ ಹೆಚ್ಚು ಕಾಲ ಹೋಗಾಡಬೇಕಾಯಿತು.
ಇದಕ್ಕೆ ಕಾರಣ ಅರ್ಕಿಮಿಡೀಸ್‌ನ ಯುಧಯಂತ್ರಗಳು.



ಲರೋಮನರು ಸೈರಾಕಾಸ್ ನಗರವನ್ನು ಅಕ್ರಮಿಸಿಕೊಂಡ ಮೇಲೆ ಅರ್ಕಿಮಿಡೀಸ್‌ನು
ರೋಮನ್ ಸೈನಿಕನೊಬ್ಬನಿಂದ ಹತನಾದನು. ಅರ್ಕಿಮಿಡೀಸ್‌ನು ಕಂಡುಹಿಡಿದ ನೀರು
ಮೇಲೆತ್ತಲ್ಪಡುವ ಯಂತ್ರವನ್ನು ಈಗಲೂ
ಈಜಿಪ್ಟ್‌ನಲ್ಲಿ ಬಳಸುತ್ತಾರೆ.

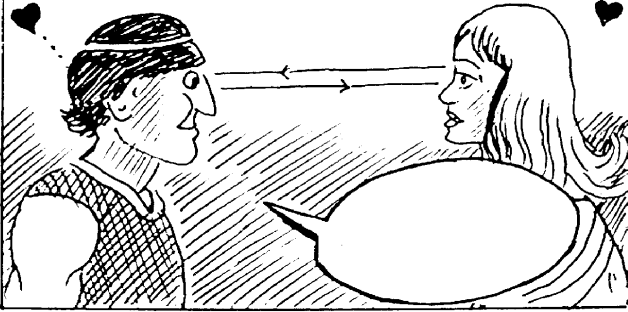


ಕ್ರಿ ಪೂ. 3ನೇ ಶತಮಾನಕ್ಕೆ ಈಜಿಪ್ಟ್ ರೋಮ್ ಸಾಮ್ರಾಜ್ಯದ ಒಂದು ಪ್ರಾಂತ್ಯವಾಗಿತ್ತು.
ವೈಜ್ಞಾನಿಕ ಸಾಧನಗಳೂ ಕ್ಷೀಣಿಸುತ್ತಿದ್ದವು. ಈಜಿಪ್ಟ್‌ನ ಹಿರೋ ಪ್ರಪಂಚದ ಅತಿ ದೊಡ್ಡ
ಮೇಧಾವಿಗಳಲ್ಲೊಬ್ಬ. ಇವನು ಮೊತ್ತ ಮೊದಲ ಲಾಗಿ ಇಂಜಿನನ್ನು ಕಂಡುಹಿಡಿದಿದ್ದ.

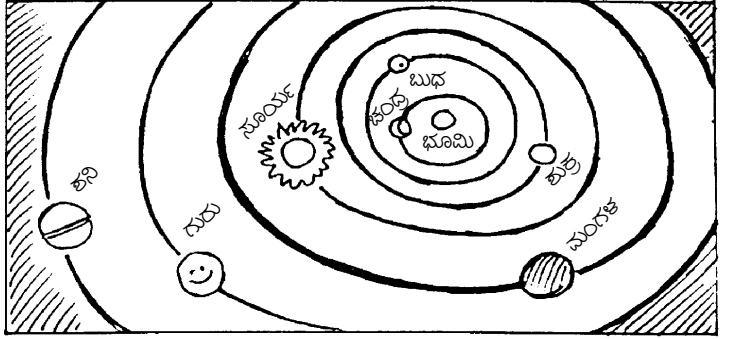


ಕ್ರಿ. ಶ. 100 ರಲ್ಲಿ

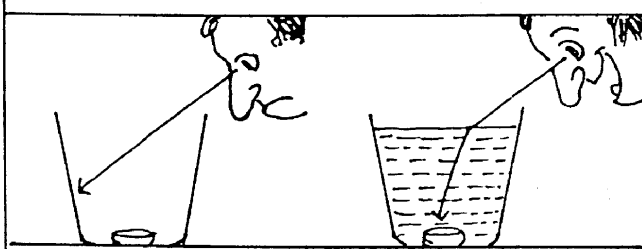
ಅವನು ಸೈಫನ್ (Siphon) ಅನ್ನು ಕಂಡುಹಿಡಿದಿದ್ದಲ್ಲದೆ, ಚಲನ ಶಾಸ್ತ್ರ ಮತ್ತು ಪ್ರತಿಫಲನ, ಶಾಸ್ತ್ರಗಳ ಮೇಲೆ ಪುಸ್ತಕಗಳನ್ನು ಬರೆದ. ಮನುಷ್ಯರ ದೃಷ್ಟಿಯ ಬಗ್ಗೆ ಆಕವಾಗಿ ಯೋಚನೆ ಮಾಡಿದ್ದ. ಇವು ಆ ಕಾಲದ ಯೋಚನಾಲಹರಿಯನ್ನು ತೋರಿಸುತ್ತವೆ.



ಟಾಲೆಮಿ (ಕ್ರಿ.ಪೂ. 127-151) ಅಲೆಕ್ಸಾಂಡ್ರಿಯಾದ ಮತ್ತೊಬ್ಬ ಮೇಧಾವಿ. ಅವನು ಭೂಮಿಯೇ ವಿಶ್ವದ ಕೇಂದ್ರ ಚಂದ್ರ ಎಂಬುದು ತಿಳಿದಿದ್ದನು. ಅದು ತಪ್ಪೆಂದು ನಮಗಿಂದು ತಿಳಿದಿದೆ.

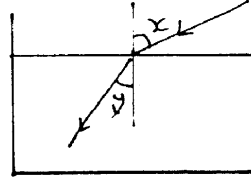


ಟಾಲೆಮಿ ಬೆಕಟಿಗೆ ಸಂಬಂಧಿಸಿದ ಹಲವು ಪ್ರಯೋಗಗಳನ್ನು ನಡೆಸಿದನು. ಬೆಕಟಿನ ವಕ್ರೀಕರಣವನ್ನು ಆಕವಾಗಿ ಅಭ್ಯಸಿಸಿದನು.



ಬೆಕಟಿನ ಕಿರಣಗಳು ಗಾಳಿ ನೀರಿನ ಗಡಿಯಲ್ಲಿ ದಾಟಿದಾಗ ಬಾಗುತ್ತವೆ. ಇದು ವಕ್ರೀಕರಣ ಇದರಿಂದಲೇ ಚಿತ್ರ (ಚಿ) ಯಲ್ಲಿ ಮಾತ್ರ ನಾಣ್ಯ ಕಾಣುವುದು.

ಪ್ರಯೋಗಗಳಿಂದ ಟಾಲೆಮಿ X ಮತ್ತು Y ಕೋನಗಳನ್ನು ಕರಾರುವಾಕ್ಕಾಗಿ ಅಳೆದ.



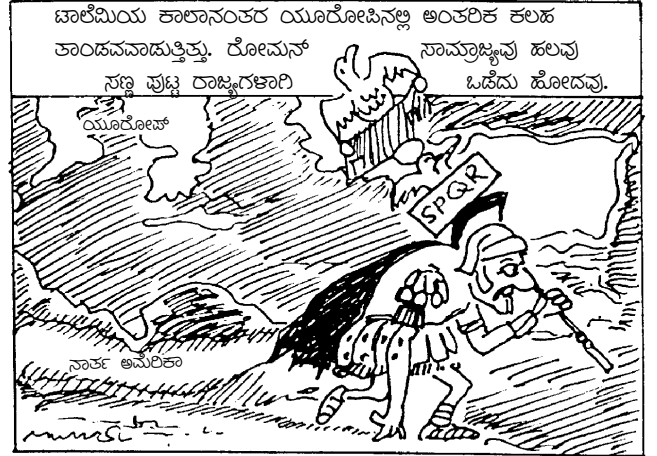
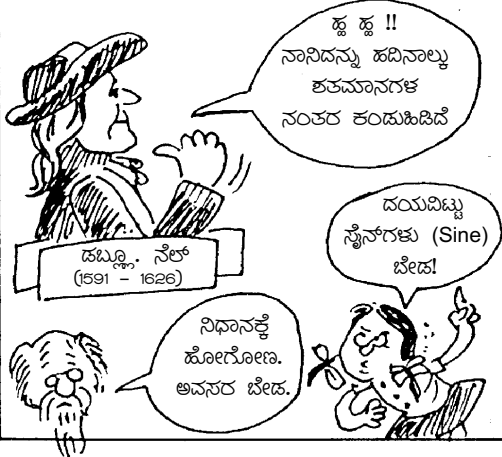
X	Y
10°	8°
40°	29°
50°	35°
80°	50°

ಆದರೆ ಇವುಗಳ ಮಧ್ಯೆ ಸಂಬಂಧ ಕಲ್ಪಿಸುವ ಸೂತ್ರ ಅವನಿಗೆ ಹೊಳೆಯಲಿಲ್ಲ.

$\frac{\sin X}{\sin Y}$

ಒಂದು

ನಿಯತಾಂಕ. ಇದನ್ನು ನೆಲ್ಸನ್ ನಿಯಮವೆಂದು ಕರೆಯುತ್ತೇವೆ.

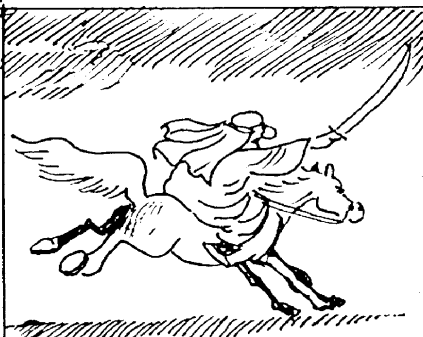


ವಿನಾಗುತ್ತಿದೆ ?

ಓಓ

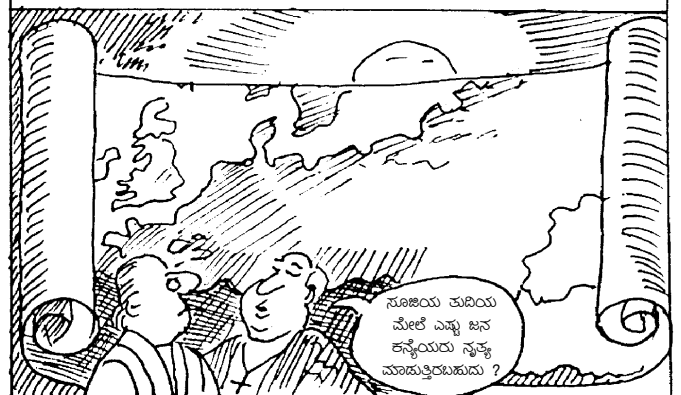
ಓಓ

ಶ್ ! ಇದು ಅಂಧಕಾರದ ಯುಗ

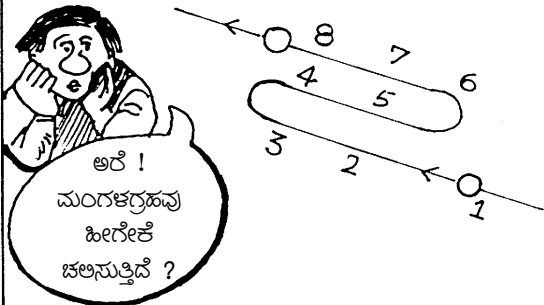


ಅರೇಬಿಯಾದ ಮೂಲನಿವಾಸಿಗಳು ಬೈಜಂಟೈನ್ ಸಾಮ್ರಾಜ್ಯವನ್ನು ಧ್ವಂಸಮಾಡಿ ಕಾಣಿಸುವುದನ್ನು ಕ್ರಿ.ಶ. 640ರಲ್ಲಿ ವಶಪಡಿಸಿಕೊಂಡರು. ಅವರು ಲೀಸ್‌ನಲ್ಲಿ ಬೆಳೆದಿದ್ದ ವಿಜ್ಞಾನವನ್ನು ಪುನರುಜ್ಜೀವನದ ಪರ್ವಕಾಲದಲ್ಲಿದ್ದ ಯುರೋಪಿಗೆ ಕೊಂಡೊಯ್ದರು.

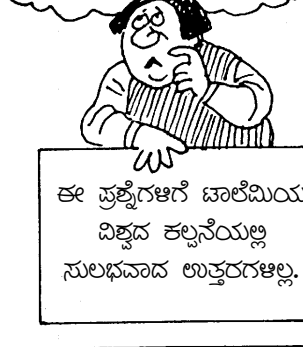
ಯುರೋಪಿನ ಪುನರುಜ್ಜೀವನ ವಿಜ್ಞಾನಕ್ಕೆ ಮರುಹುಟ್ಟನ್ನೇನೂ ಕೊಡಲಿಲ್ಲ.



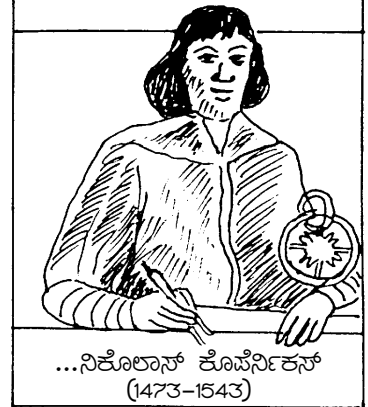
పునరుజ్జీవనద నంతరద ధార్మిక సంఘికేగళు
కుకూలల మనోవృత్తియన్ను లుక్తజనల్లు.



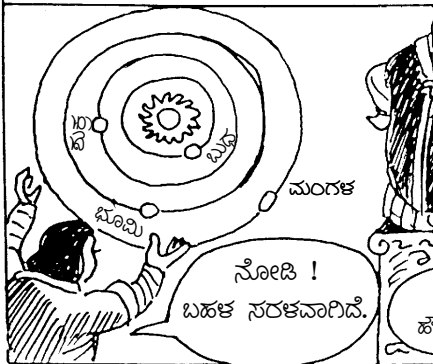
నావు శుక్ర గ్రహవన్ను ఆకాశద
మధ్యదల్లి నోణే ఇల్లి ఏకే?



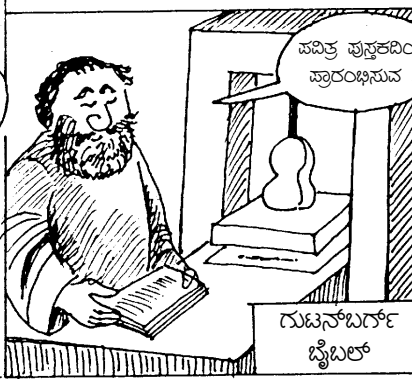
అగ బందను....



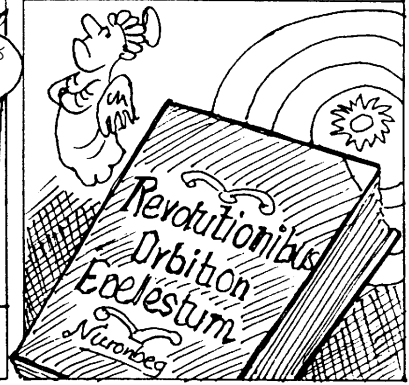
ఇదను సూర్యనన్ను నిల్లిసి
భూమియన్ను జలసువంతే మాడిదను !



ఇదక్తే సుమారు 100 వర్షగళ హిందే
గుటెనబర్గ్ ముద్రణ యంత్రవన్ను కండుహిడిదిద్ద.



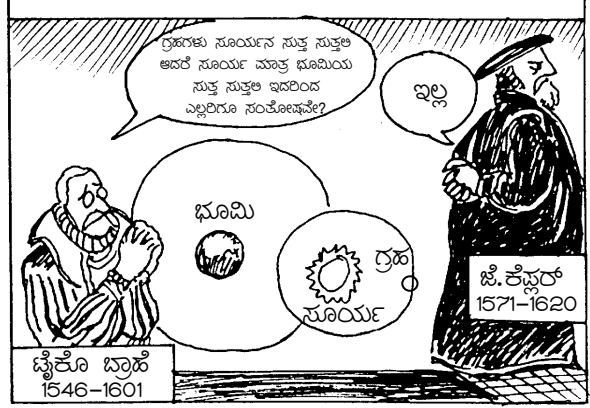
కొపేర్నికస్ అపదిత సిద్ధాంతగళు
1543 రల్లి ముద్రణగోండువు



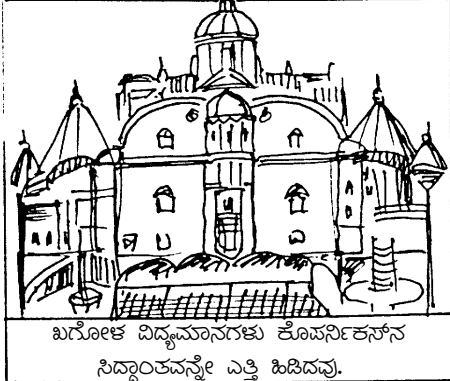
కొపేర్నికస్ సిద్ధాంతవన్ను
కేలవరు ఓమ్మేగే ఓప్పిద్దరు....



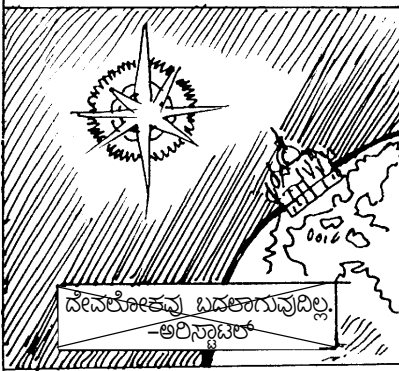
....కేలవరు సల్ల జోకాసి మాడలు ప్రయత్నిసిదరు



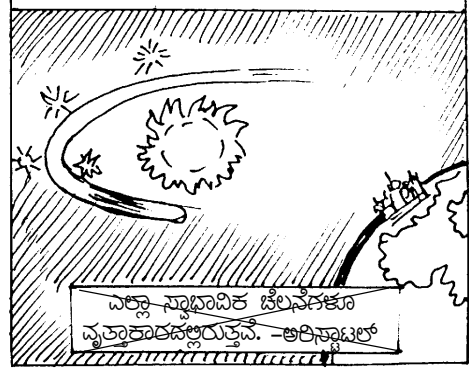
ఆక్స్ ఫోర్డందరే ట్టేకోరే కన్న స్థంక సంకేతనాయుల
స్టేనోనింద (జేన్మాకో) గమనిసిద్ద



ట్టేకోరే ఓందు హేస నక్షత్ర హేక్తి
లలియువుదన్ను గమనిసిద (క్రి.శ.1572)



బరక దోడ్ పథదల్లి జలసువ
ధూమకేరువేందన్ను కూడ గమనిసిద



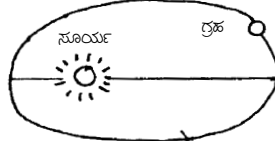
ఆదర్ గ్రెగోరి భౌతికశాస్త్రజ్ఞుడై బలవాద పేష్టు బద్ధుడు ఢిల్లీకొలన శిష్యునొబ్బినాడు.



గ్రెగోరియస్ కెప్లర్
(1571-1630)

ఢిల్లీకొలన సంక్రమిస్తూ అంతరిక్షాన్ని కేప్లర్ ను సూక్ష్మంగా పరిశీలిస్తానని. ఇదిరింద గ్రహులు జలసుమార మూడు నియమగణనను పాటించుతే ఎందు కితియితు

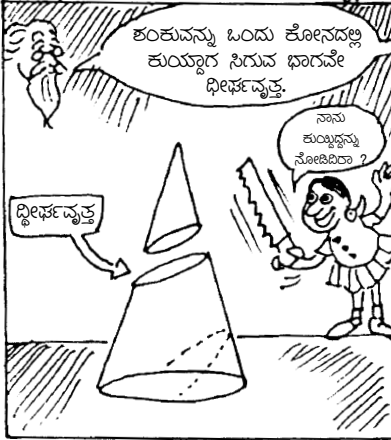
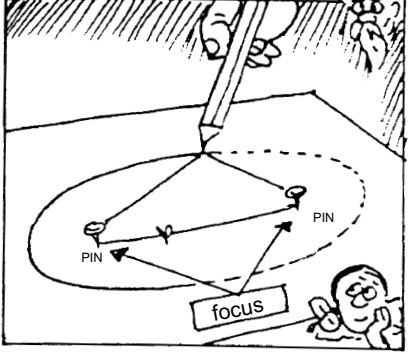
గ్రహులు దిశాభివృత్తకారణ పథగణన జరిగిస్తున్నాయి. ఈ పథగణన ఎందు foci గణన సూర్యుని యావృదానరేందు focus నల్లి ఇరుచ్చునే.



మోడల్స్ నియమ (1609)

ఓండు నియమ కాళి. ఢిల్లీకొలన అందరే ఏను? Focus అందరే ?

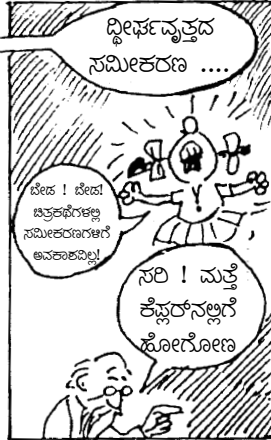
ఓండు పేస్టిల్, దార మత్తు ఎరడు సూరిగణన బళిసి సులభంగా దిశాభివృత్తాన్ని రజిస్టరు. సూరిగణన స్థానాన్ని focus ఎందు కరేయిచ్చునే.



తంకువన్ను ఓండు కేలనదల్లి కుయ్యగ సిగుద భాగవే దిశాభివృత్త.

నాను కుయ్యగన్ను నేలెదిరినా ?

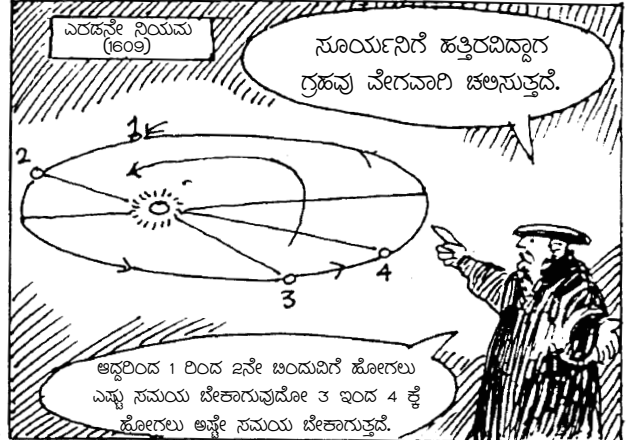
దిశాభివృత్త



దిశాభివృత్తద సమీకరణ

బేర ! బేర ! బిత్తకణిగణన సమీకరణగణన అవకాశాన్ని

సరి ! మత్తు కేప్లర్ నల్లిగే శోలనోలన

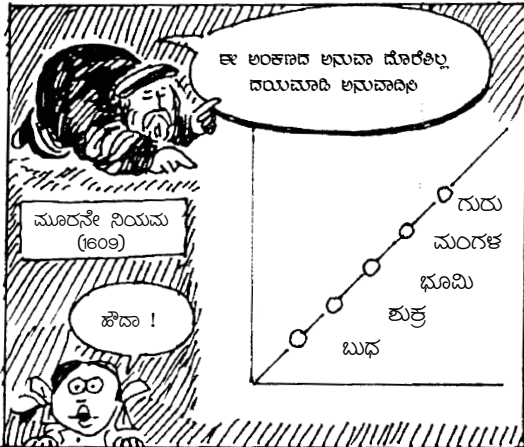


ఎరడనే నియమ (1609)

సూర్యునిగే కత్తిరదిద్దగ గ్రహు వేగవారి జరిగిస్తున్నాయి.

అద్దరింద 1 రింద 2నే జండుదినే శోలగలు ఎచ్చు సమయ బేరగవుదోల 3 ఇంద 4 క్కే శోలగలు అద్దే సమయ బేరగవుదనే.

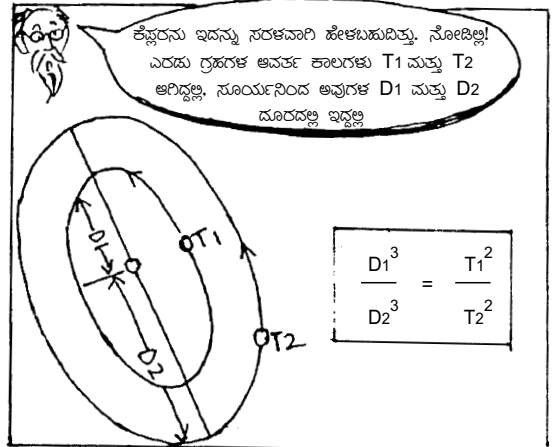
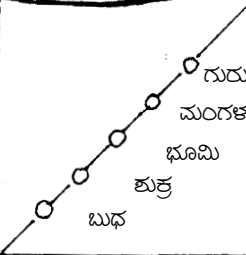
కేప్లర్ ను ఈ ఎరడు నియమగణన కన్న 'అన్యాయమియ నేలె' పుస్తకదల్లి ప్రకటిస్తానని. మూరనే నియమవన్ను 'హమోని ఆఫ్ ద వర్ల్డ్' నల్లి ప్రకటిస్తానని. ఇదొండు అధ్యాత్మ రహస్యగణ పుస్తక !



ఈ లంకాద లనుదా డోరేలి వయిమూది లనుదాది

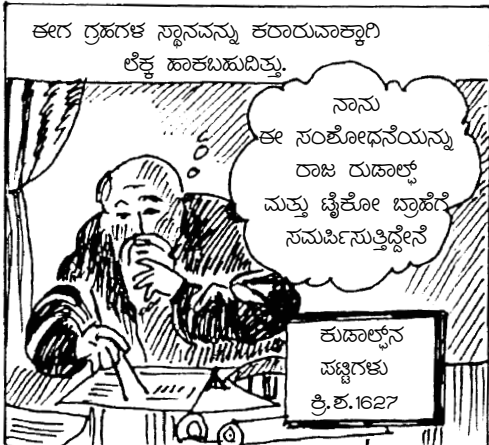
మూరనే నియమ (1609)

శోదా !



కేప్లర్ ను ఇదన్న సరకవారి శోలబుదిచ్చు నేలెదిల్లి! ఎరడు గ్రహగణ అవకాశాలగణ T1 మత్తు T2 అగిద్దల్లి. సూర్యునింద అవుగణ D1 మత్తు D2 దూరదల్లి ఇద్దల్లి

$$\frac{D_1^3}{D_2^3} = \frac{T_1^2}{T_2^2}$$

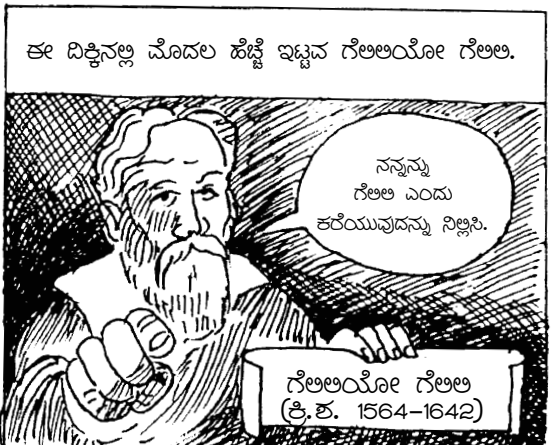


కేర గ్రహగణ స్థానాన్ని కదారుదాకాగి లేక కారబుదిచ్చు.

నాను ఈ సంశోధనయన్ను రాజ రుదాల్ మత్తు ఢిల్లీకొలన బ్రాహ్మ సమర్పిస్తున్నానని

కుడాల్స్ వణ్ణగణ క్రి.శ. 1627

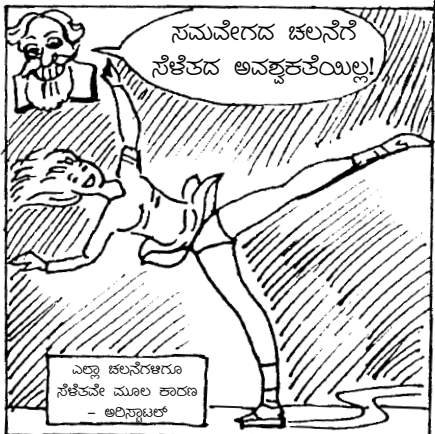
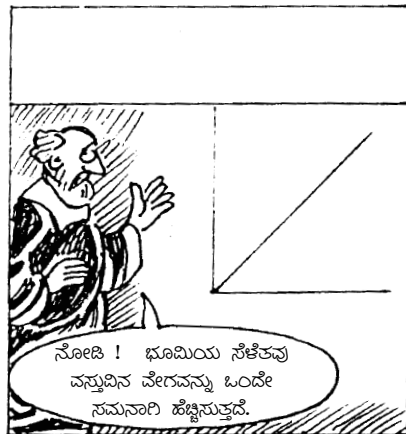
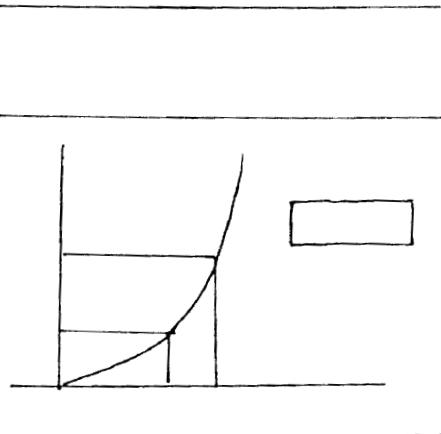
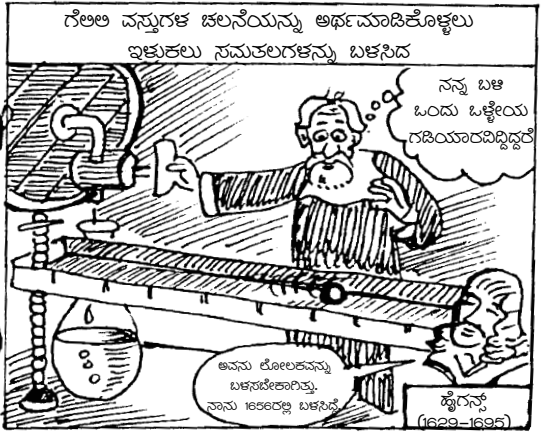
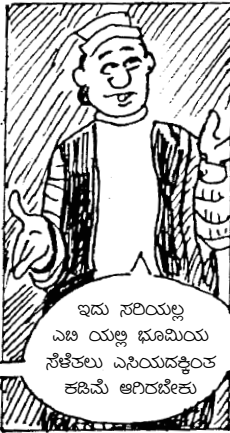
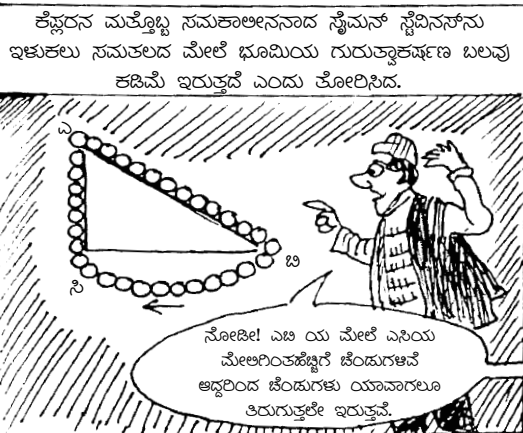
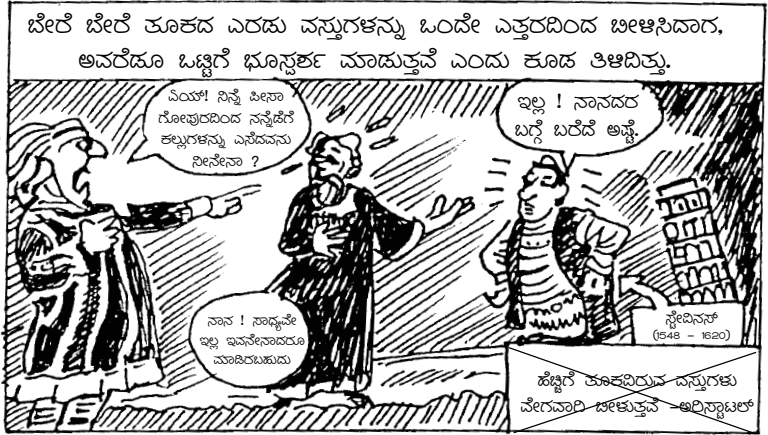
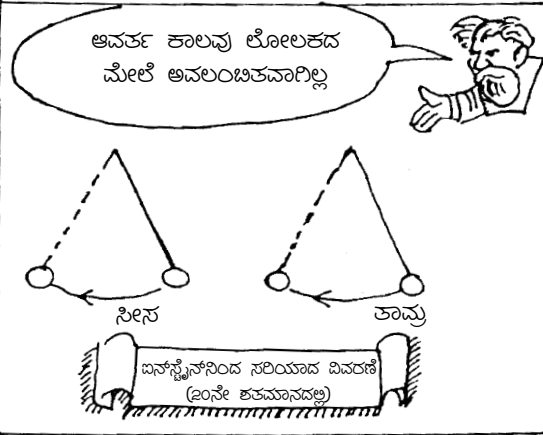
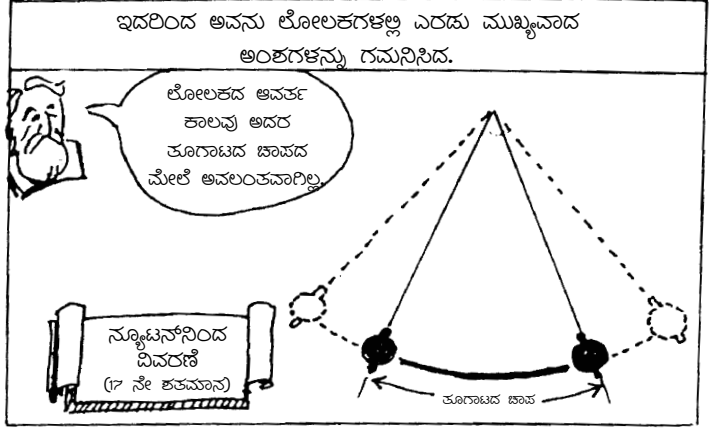
నానిగ గ్రెగోరి కాలక్రింద బరక ముందే బందిద్దేవే. ఆకాశ కాయగణు శోగే జరిగిస్తున్నాయి ఎంబుదు నమనిగ కితిది. ఆదర్ అవు ఏకే జరిగిస్తున్నాయి ?

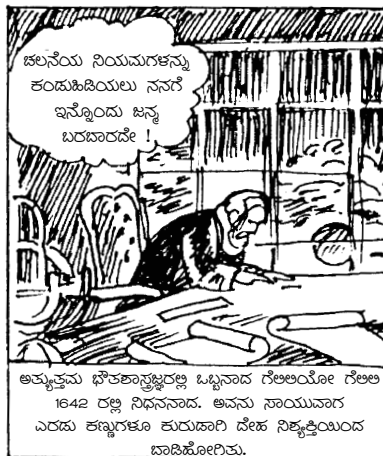
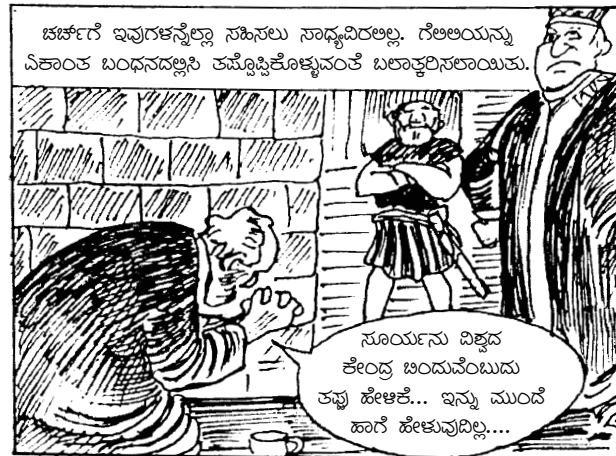
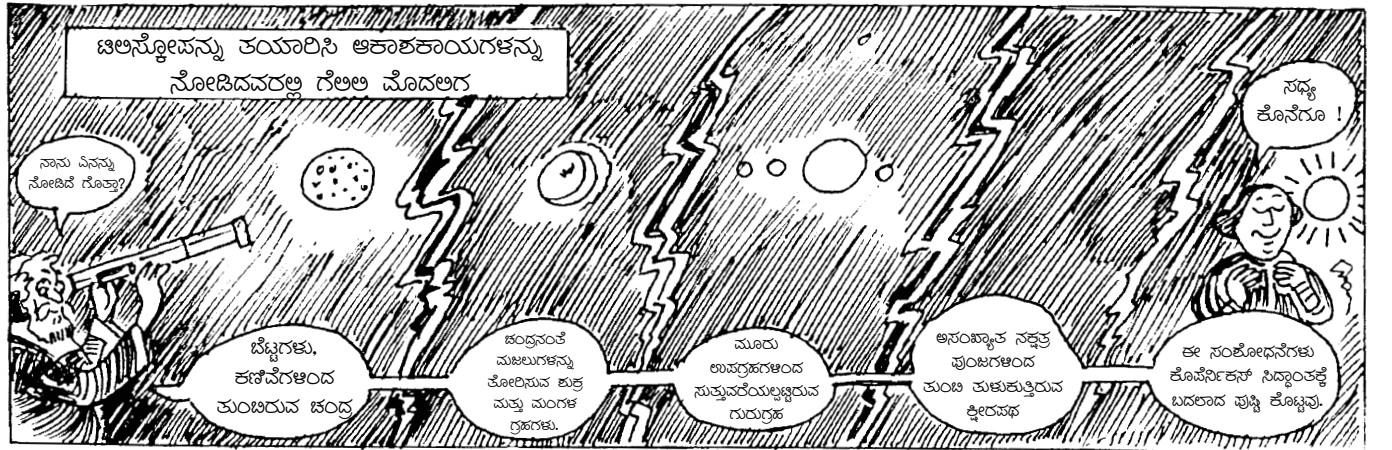
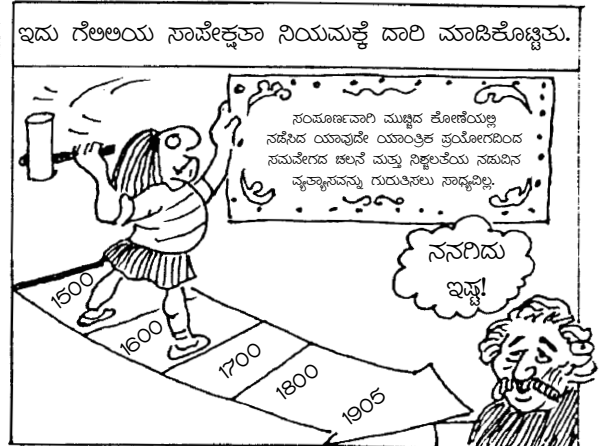
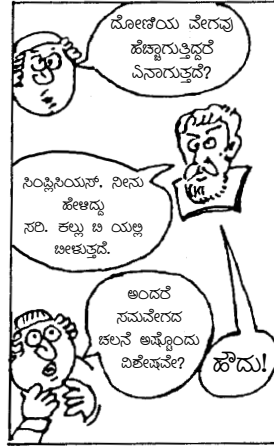
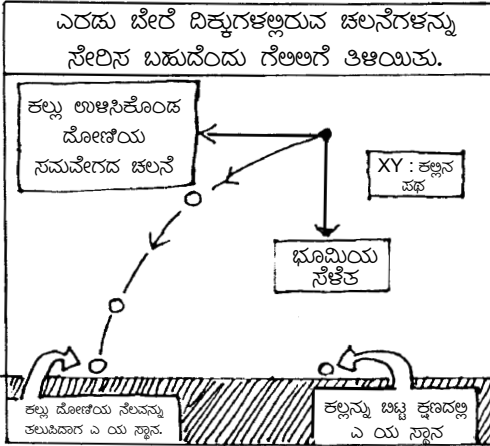
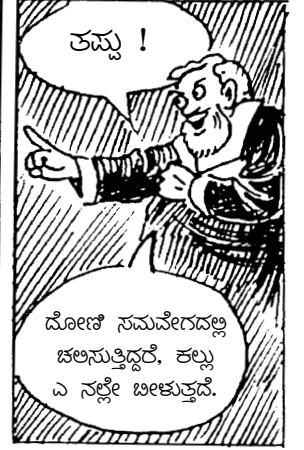
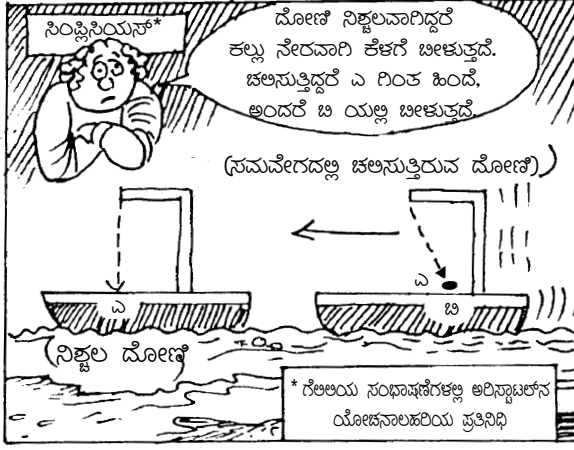
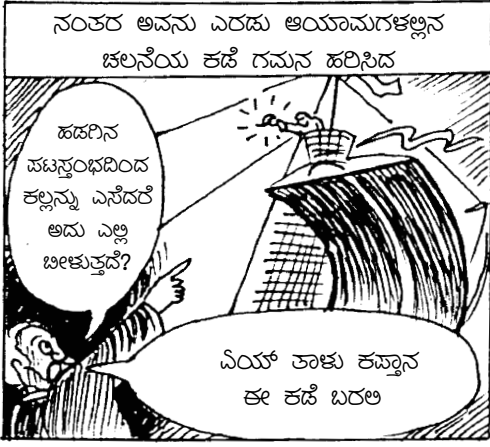


ఈ దిక్కినల్లి మోదల శోజ్జే ఇట్ట గేలయోల గేలయి.

నన్ను గేలయి ఎందు కరేయిచ్చున్నా నిల్లిసి.

గేలయోల గేలయి (క్రి.శ. 1564-1642)



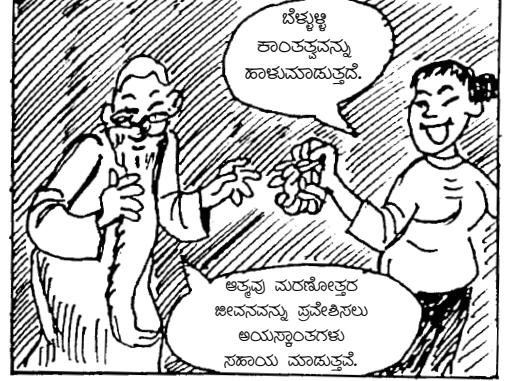


ಚಲನಶಾಸ್ತ್ರವು
ನಾಗಾಲೋಟದಲ್ಲಿ
ಬೆಳೆಯುತ್ತಿದ್ದಾಗ
ಕಾಂತ್ ಮತ್ತು ಡ್ಯಾಳಿ
ಶಾಸ್ತ್ರಗಳು ನಿಧಾನವಾಗಿ
ಬೆಳೆಯುತ್ತಿದ್ದವು.

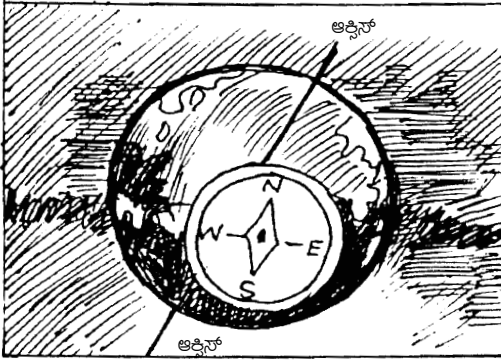
ಲೋಡ್ ಶಿಲೆಗಳ (ಸ್ವಾಭಾವಿಕ ಅಯಸ್ಕಾಂತಗಳು) ಬಗ್ಗೆ ಚೀನಾ ದೇಶದ
ಗಣಿ ಕಾರ್ಮಿಕರಿಗೆ ಬಹಳ ಹಿಂದಿನ ಕಾಲದಿಂದಲೂ ಗೊತ್ತಿತ್ತು
(ಕ್ರಿ.ಪೂ.2500)



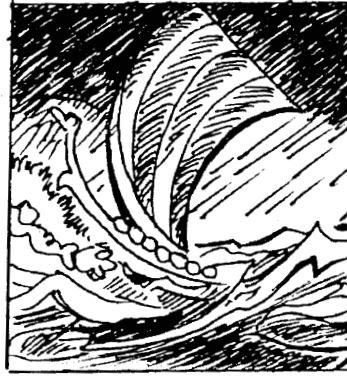
ಬಹಳ ಕಾಲದಿಂದಲೂ ಕಾಂತ್ ಮತ್ತು ಡ್ಯಾಳಿ
ಇಂದ್ರಜಾಲವೆಂದು ಪರಿಗಣಿಸಲಾಗುತ್ತಿತ್ತು.



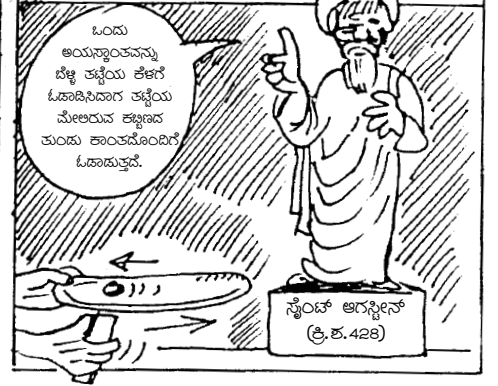
ಅಯಸ್ಕಾಂತದ "ಉತ್ತರ ದಿಕ್ಕನ್ನು ಅರಸುವ"
ಗುಣವನ್ನು ಯಾರು ಕಂಡುಹಿಡಿದರೋ ಗೊತ್ತಿಲ್ಲ.



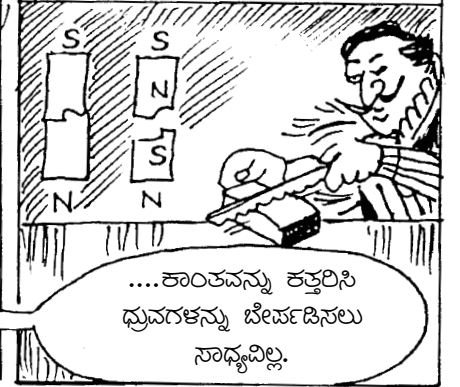
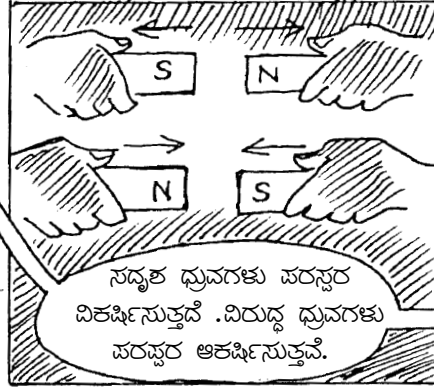
ಅದರೇ ಕ್ರಿ.ಪೂ. 900 ರ ಹೊತ್ತಿಗಾಗಲೇ
ನೌಕಾಯಾನಗಳಲ್ಲಿ ದಿಕ್ಕು ತಿಳಿಯಲು
ಕಾಂತ್ ಸೂಚಿಯನ್ನು ಬಳಸಲಾಗುತ್ತಿತ್ತು



ಹಲವರಿಗೆ ಅಯಸ್ಕಾಂತದ ಆಕರ್ಷಣಾ
ಬಲವು ನಿರೂಪವಾಗಿ ಕಂಡಿತು.



ಕಾಂತ್‌ಗೆ ಸಂಬಂಧಿಸಿದ ಪ್ರಯೋಗಗಳನ್ನು ಮಾಡುವುದರಲ್ಲಿ ಫ್ರಾನ್ಸ್ ದೇಶದ ಎಂಜಿನಿಯರ್ ಪೆರಿಗ್ರಿನಸ್ ಪ್ರಾಯಶಃ ಮೊದಲಿಗೆ



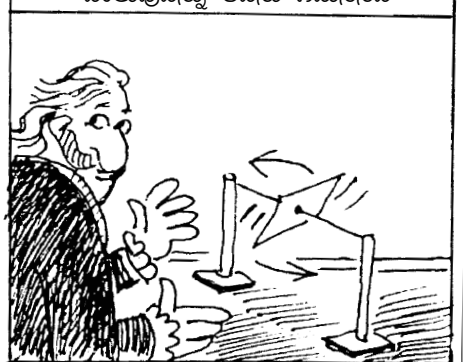
ಅದರೇ ಕಾಂತ್‌ನ ಉತ್ತರ ದಿಕ್ಕನ್ನು ಅರಸುವ
ಗುಣಕ್ಕೆ ಅವನು ನೀಡಿದ ವಿವರಣೆ ಸರಿಯಿರಲಿಲ್ಲ.



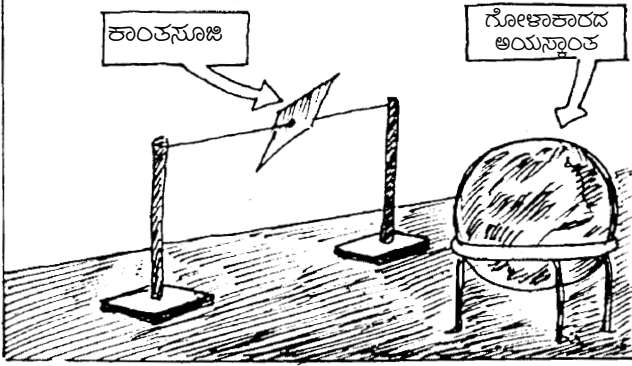
ವಿಲಿಯಂ ಗಿಲ್ಬರ್ಟ್ (1544-1603) ಕೆರೆಯ
ಮೇಲೆ ಬರುವವರೆಗೂ ಕಾಂತ್‌ವು
ನಿರೂಪವಾಗಿಯೇ ಉಳಿದಿತ್ತು.



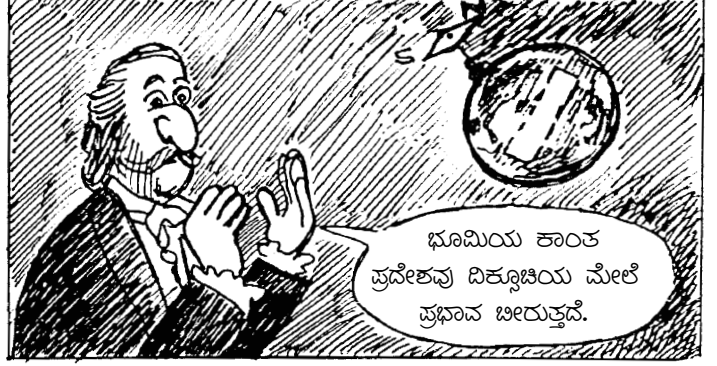
ಕಾಂತ್ ಸೂಚಿಗೆ ಲಂಬವಾಗಿ ಚಲಿಸಲು
ಅವಕಾಶವಿದ್ದಾಗ ಅದು ಭೂಮಿಯಕಡೆ
ವಾಲುವುದನ್ನು ಅವನು ಗಮನಿಸಿದ



కాంత సూర్యున్ని గోళాకారద అయిస్తాంకద
బళి ఇట్లాగలూ అదు గోళకద కడయే వాలతు.



ఇదన్న గమనిసిన విఅయం గిల్బర్ట్
భూమి ఒండు డోడ్డ అయిస్తాంకవేండు ప్రతిపాదినద !



లుజ్జిద తేల స్వకవ ఓణ మల్లన్న ఆర్కనుత్తదే.
ఎంబుదు గ్రికర కాలదిండులూ కిళిదిత్తు.

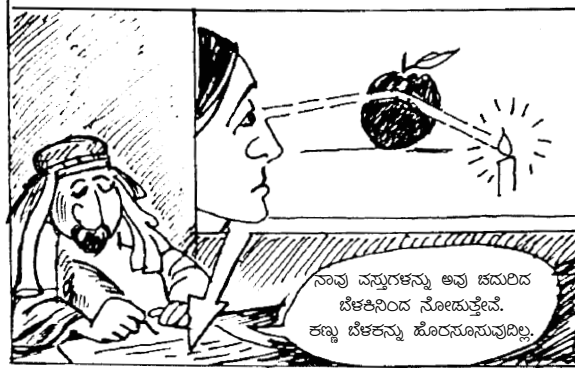


కే వర్కనేయన్న గిల్బర్ట్ కలవారు వన్నగళల్లి
రమనిసిన అంకర వన్నగళన్న ఇలేక్ట్రిక్ ఎండు కరేద.

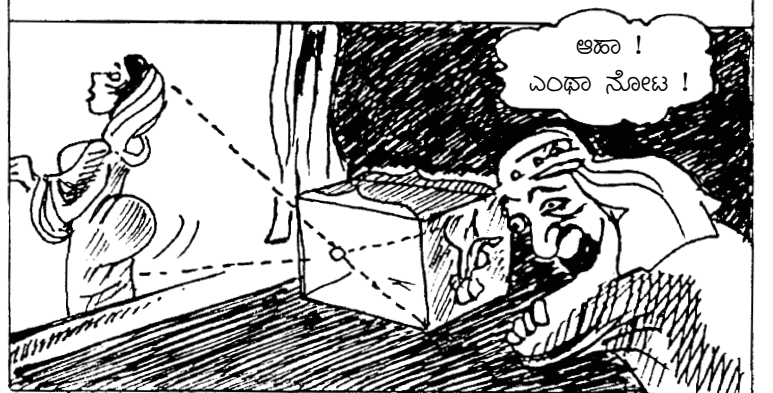
ఇదే నమయదల్లి
దృష్టి తాస్త్రదల్లి
కూడ స్వల్ప
బేకవశేగే ఆరిత్తు.
అల్ హేజ్జన్
(క్రి.శ. 965-1039)
జివన విస్యయ
ఫటనేగళిండు
కూడిత్తు...



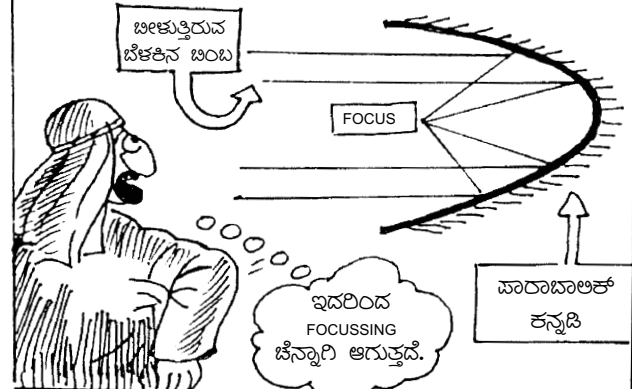
అల్ హేజ్జన్ హేరగడే మజ్జనంకే నజిసుత్తా,
రహస్యదల్లి తన్న ప్రయోగగళన్న నడిసిదను!



అవను ఒండు పిన హేలోల్ క్యామరావన్న కూడ కయారిసిద.

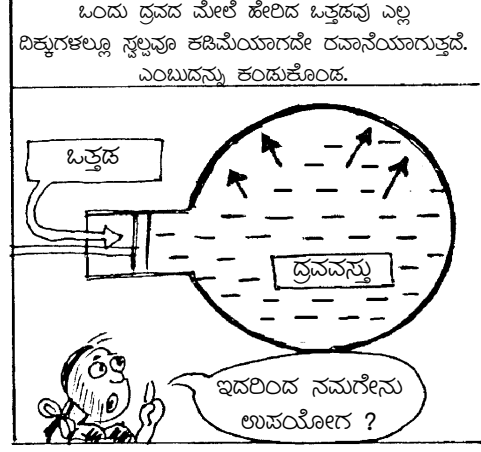
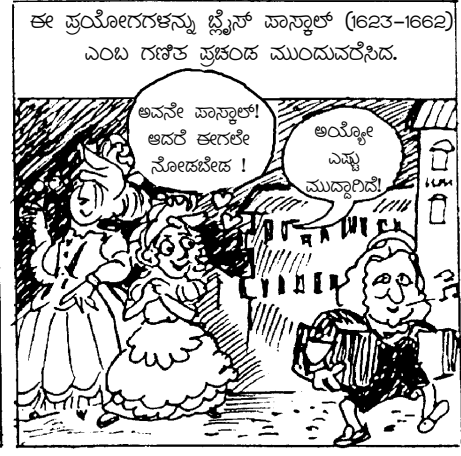
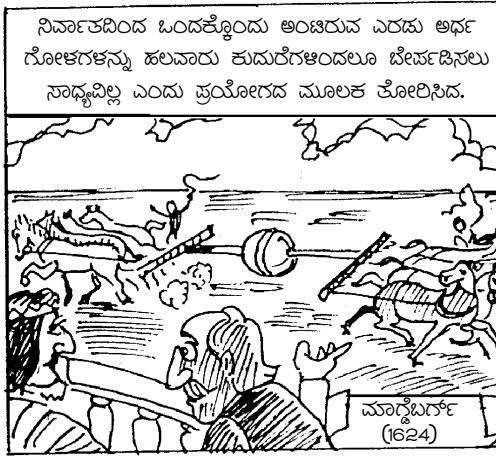
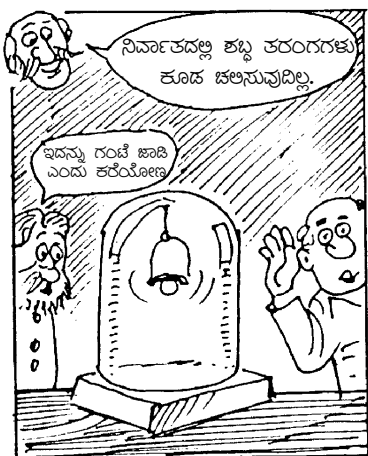
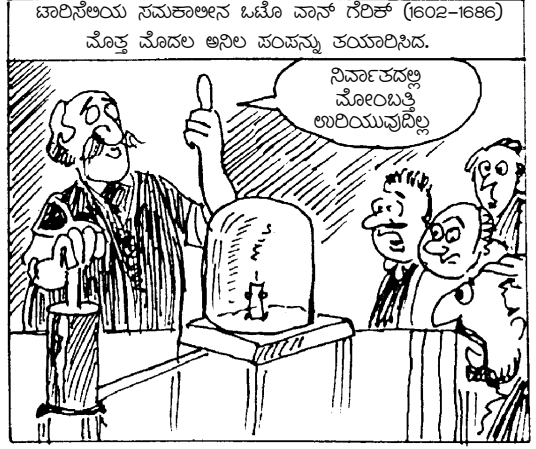
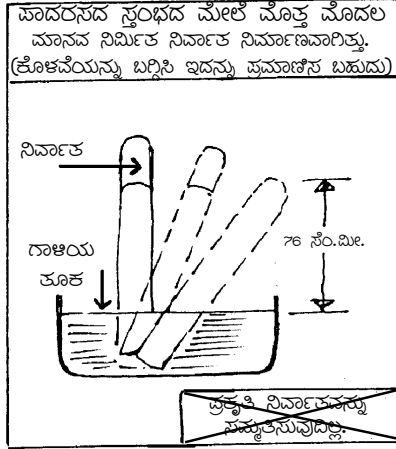
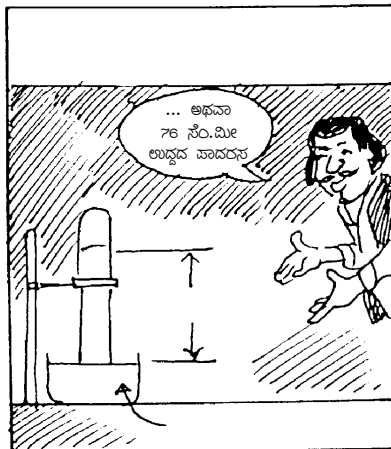
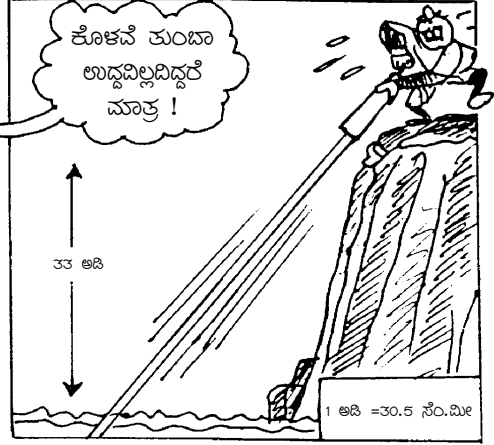
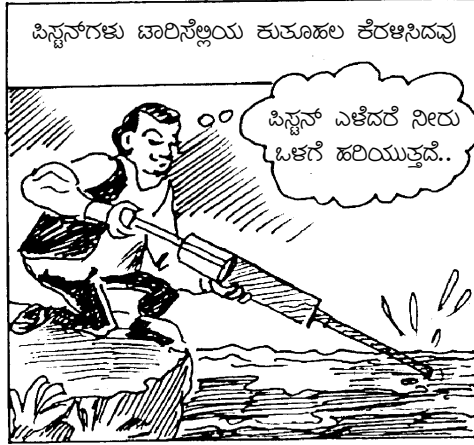
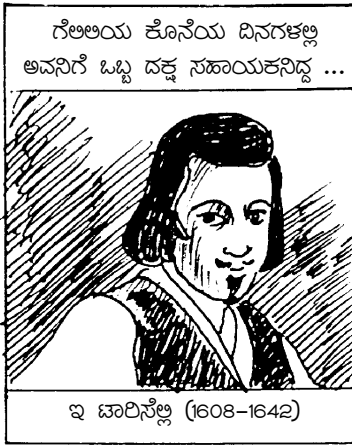


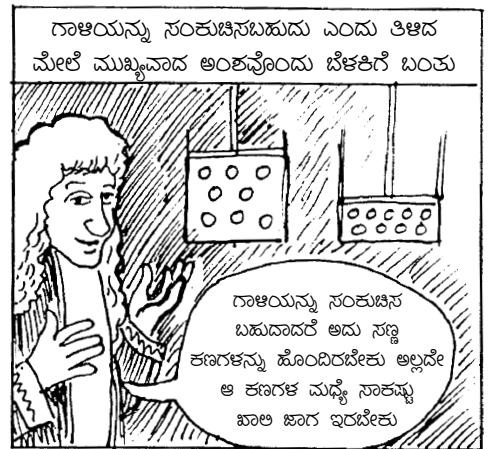
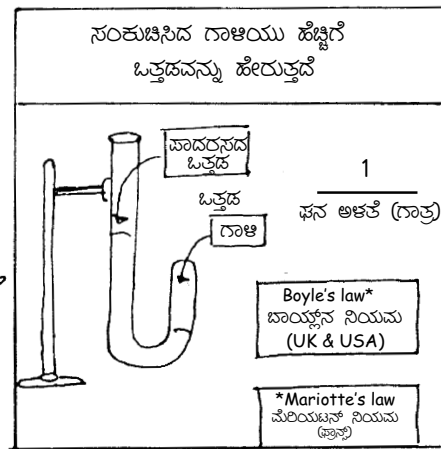
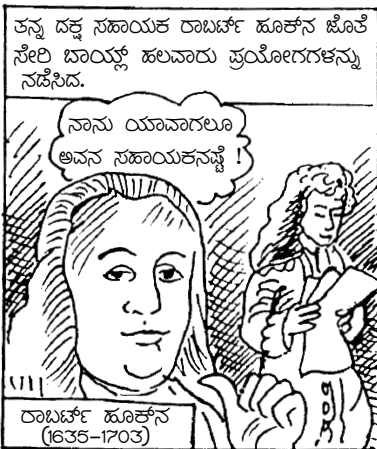
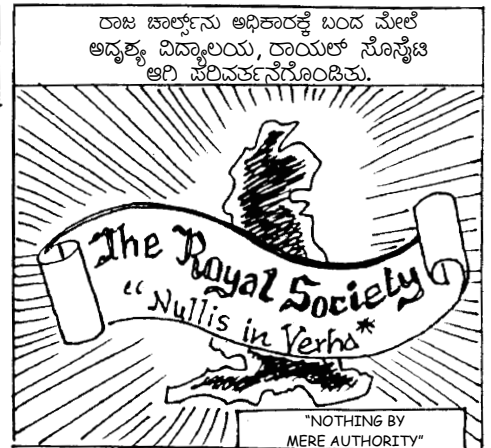
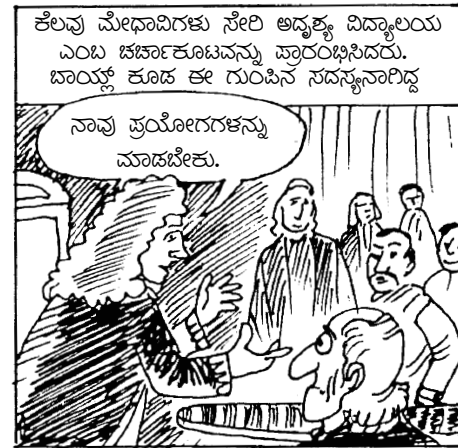
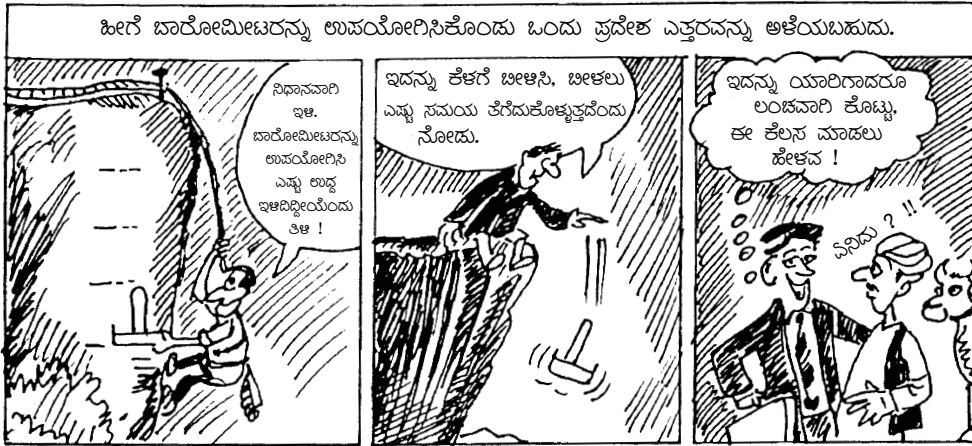
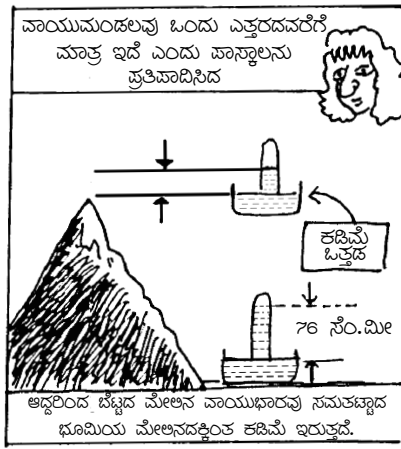
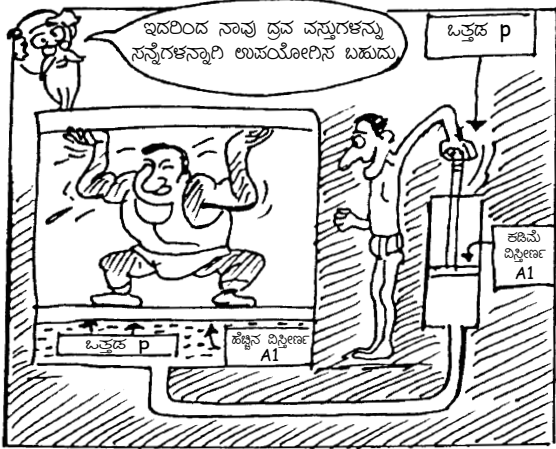
అల్లదే పారాబాలిక్ కన్నడిగళన్న
కూడ కయారిసిద



అల్ హేజ్జన్ ను దవణగళు, వక్రికరణ మత్తు ప్రతిఫలనగళన్న
సూక్ష్మవారి అధ్యయన మాదిదరూ టేలిస్కోపవన్న కండుకెడియల్లి !



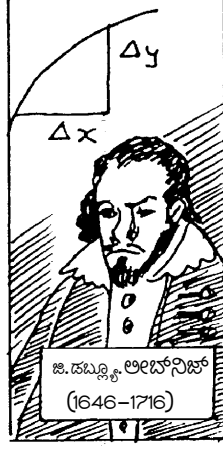




ಹದಿನೇಳನೇ
ಶತಮಾನದ
ಉತ್ತರಾರ್ಧದಲ್ಲಿ
ಯೂರೋಪಿನಲ್ಲಿ
ಹಲವಾರು
ಪ್ರತಿಭಾವಂತ
ವಿಜ್ಞಾನಿಗಳು
ಪ್ರಜ್ಞಾಪಿಸಿದರು.



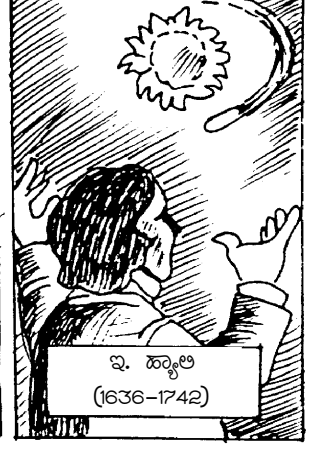
ಸಿ. ಗ್ಯಾಲಿಲೆ
(1629-1716)



ಜಿ.ಡಬ್ಲ್ಯೂ.ಅಲೆಕ್ಸಾಂಡರ್
(1646-1716)



ಆರ್. ಹುಕ್
(1635-1703)



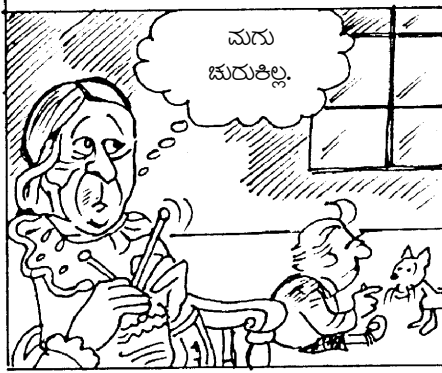
ಕ್ರಿ. ವ್ಯಾಂ
(1636-1742)

ಅದರಲ್ಲಿ ಇವರೆಲ್ಲರಿಗೂ ಕಳಶಪ್ರಾಯವಾಗಿದ್ದವು



ದಿಸಾಕ್ ಗ್ಯಾಲಿಲೆ
(1642-1727)

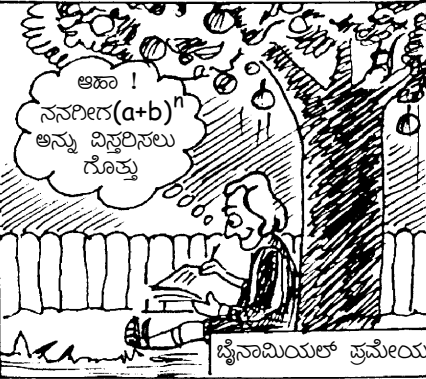
ನ್ಯೂಟನ್ ಚಿಕ್ಕವನಾಗಿದ್ದಾಗ ಅವನನ್ನು ಅವನ
ಅಜ್ಜ-ಅಜ್ಜಿಯರು ನೋಡಿಕೊಂಡರು.



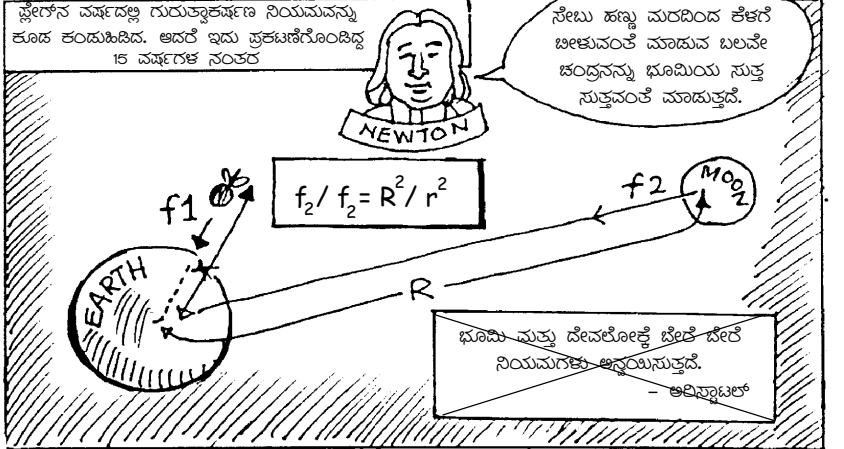
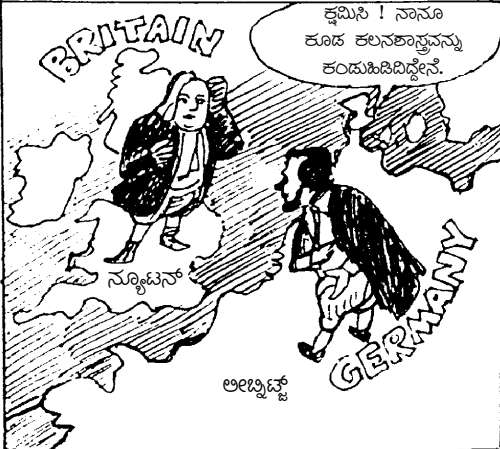
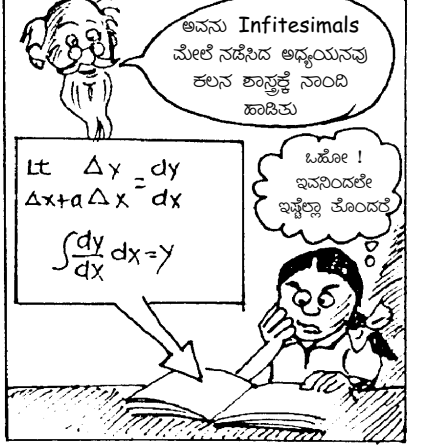
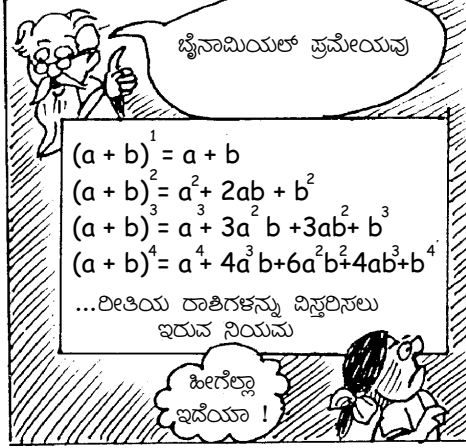
1665 ರಲ್ಲಿ ಕೇಂಬ್ರಿಡ್ಜ್ನ ಟ್ರಿನಿಟಿ ಕಾಲೇಜಿನಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಯಾಗಿ
ಮುಗಿಸಿದ. 1665-67ರ ಪ್ಲೇಗ್ ಮಾರಿಯ ನಂದರ್ಭದಲ್ಲಿ
ತನ್ನ ತಾಯಿಯ ತೋಟದಲ್ಲಿ ವಾಸ ಮಾಡಿ ಬೆಳೆದ.

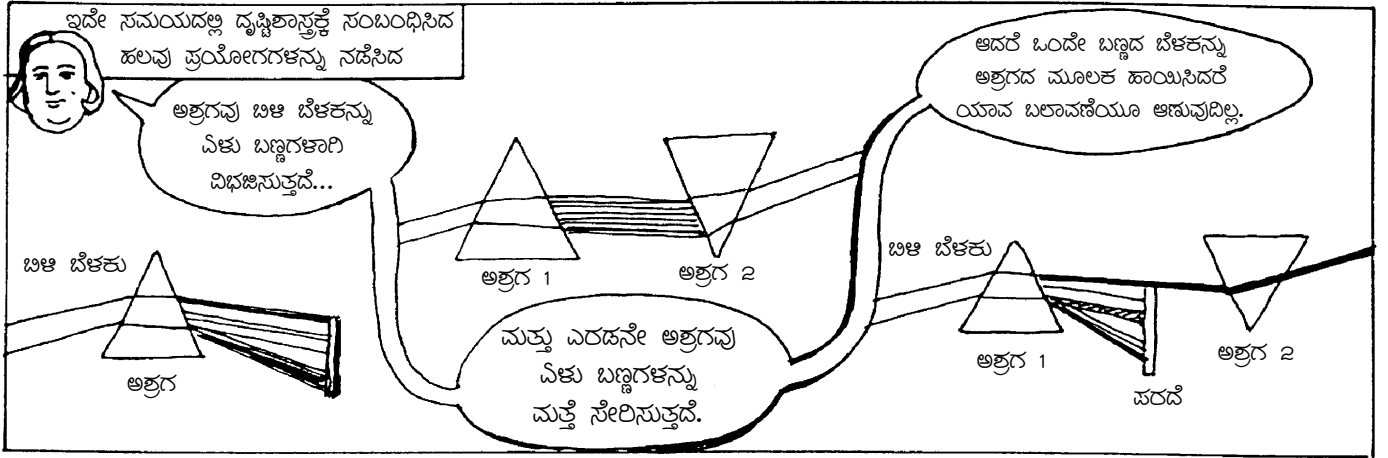


ಕಾಲೇಜು ವಿದ್ಯಾರ್ಥಿಯಾಗಿದ್ದ ಮೇಲೆ ಅವನ
ಅನಾಧಾರಣ ಪ್ರತಿಭೆ ಬೆಳಕಿಗೆ ಬಂತು.

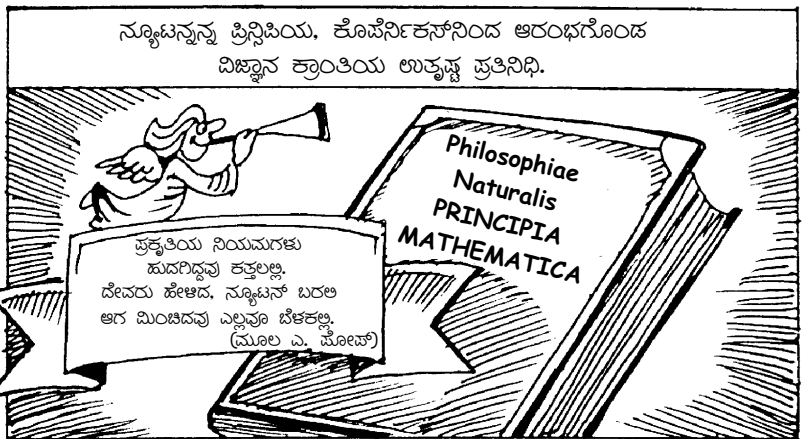
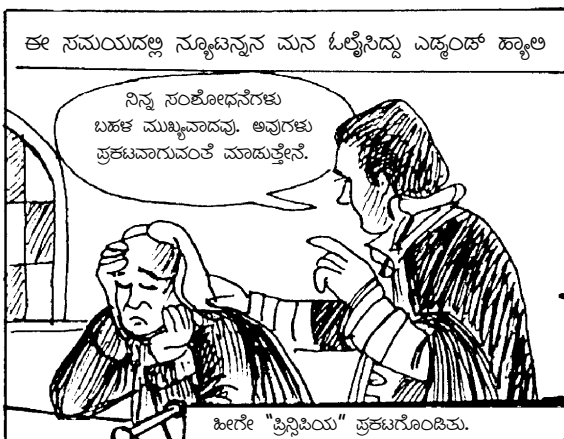
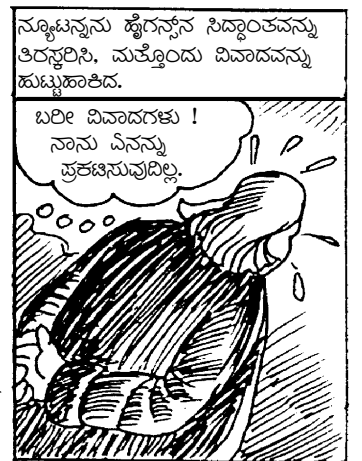
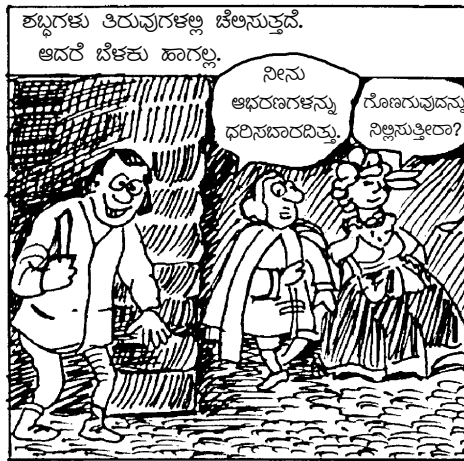
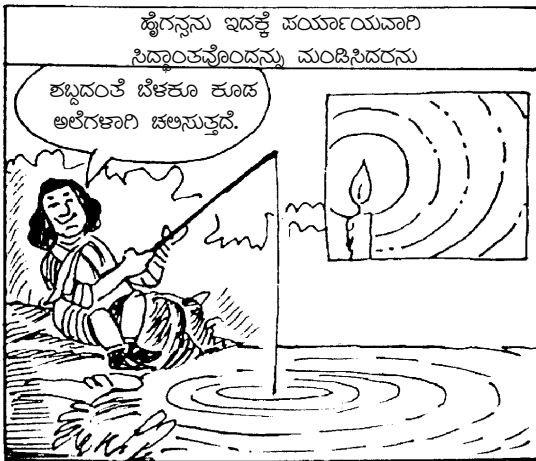
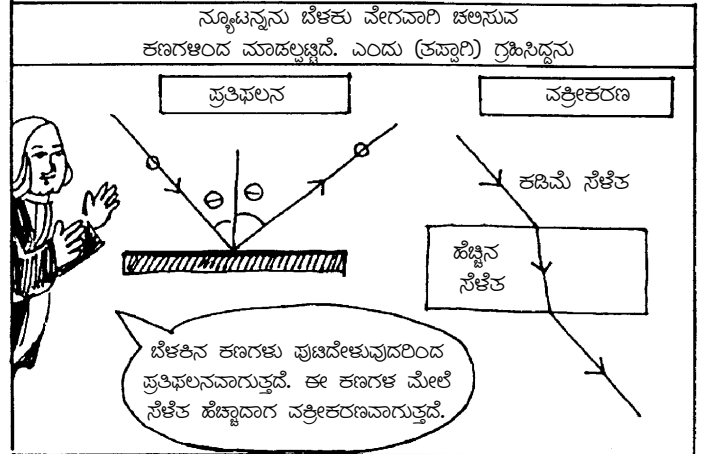


ಬೈನಾಮಿಯಲ್ ಪ್ರಮೇಯ





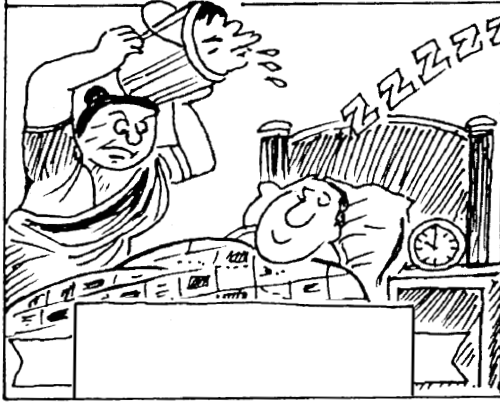
ಈ ಪ್ರಯೋಗಗಳಿಂದ
ನ್ಯೂಟನ್ ಕೀರ್ತಿ ಪಡೆದ
ಉಚ್ಚಂಗಕ್ಕೆಲಿರು. 1669 ರಲ್ಲಿ
ಕೇಂಬ್ರಿಜ್ ವಿಶ್ವವಿದ್ಯಾಲಯದಲ್ಲಿ
ಪ್ರಾಧ್ಯಾಪಕನಾಗಿ
ನೇಮಕಗೊಂಡನು
1672 ರಲ್ಲಿ ರಾಯಲ್
ಸೊಸೈಟಿಯ
ಗೌರವ ಸದಸ್ಯತ್ವವೂ
ದೊರೆಯಿತು. ರಾಬರ್ಟ್ ಹುಕ್
ಮುಂತಾದವರೊಡನೆ
ಆಜನ್ಯ ವೈರತ್ವವೂ
ಪ್ರಾರಂಭವಾಯಿತು.



"Mathematical Principles of Natural Philosophy" యల్ల

న్యూటన్ ను
యాంత్రిక విశ్లేషణ
నియమాలను
ప్రకటించినాడు.

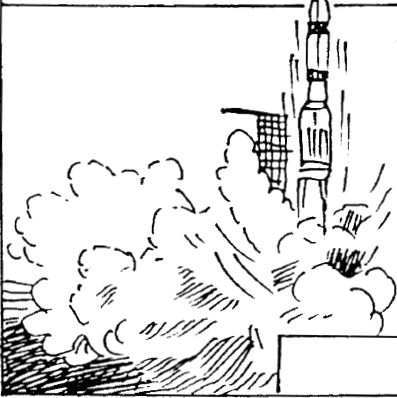
గోలొయ్ యోజనలలో న్యూటన్ ఒక రూప కోట్ల ఖరీదైన నియమాలను.



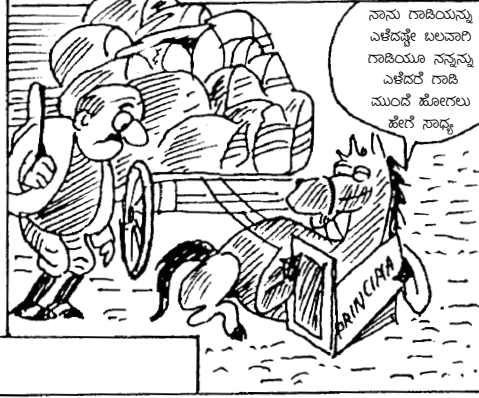
ఎరడనో నియమ :
వేగం = దూర / సమయం



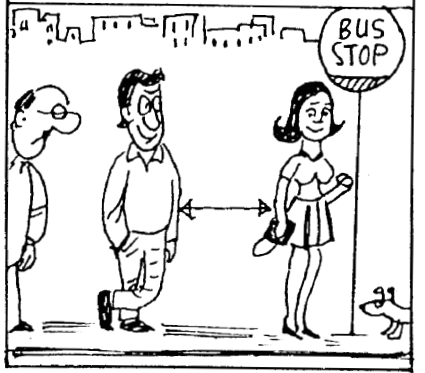
మత్తు ప్రసిద్ధ మూలనో నియమ



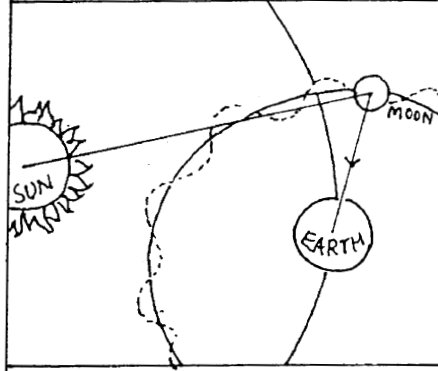
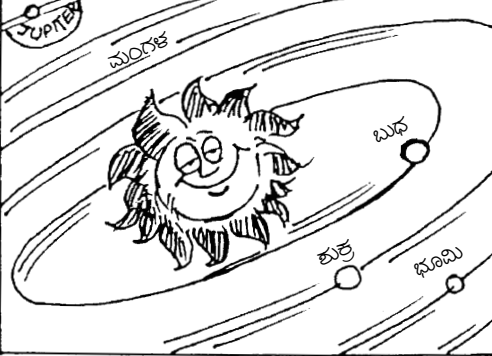
మత్తు అదర విశిష్టతలు



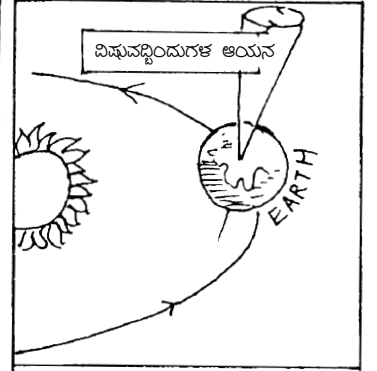
అల్లనో, న్యూటన్ విశ్లేషణ యావద్దే ఎరడు వస్తుక నడువిన గురుత్వాకర్షణ బలవన్న కండుబిడినాడు.



కేప్లర్ నియమాలను కూడ గణిత సమీక్షలలో కండుబిడినాడు ఇదివరకే నియమాలను సరియారి తిరిగించాడు.

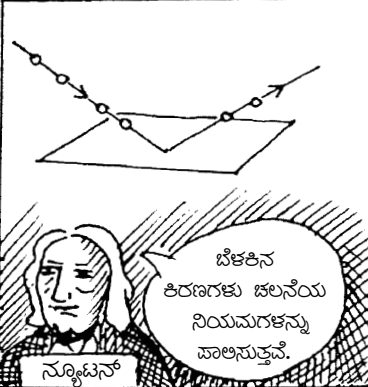


అవను, జంధన వ్యతిరేకవాద జలనో...



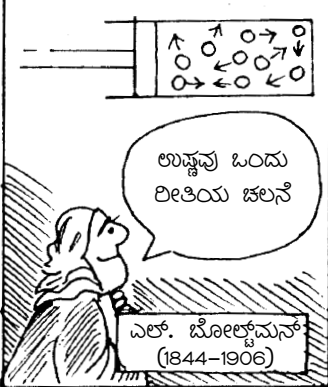
...మత్తు విశ్వవర్తిమంగళ ఆయన మత్తు భూమియ జలనోయల్లరువ కూడా వివరించాడు.

న్యూటన్ విశ్లేషణలో...



న్యూటన్ విశ్లేషణ యాంత్రిక ధృష్టి భౌతికశాస్త్రజ్ఞుల మేలే బహుళ కాలవరేగూ ప్రభావ బలెరిచ్చు.

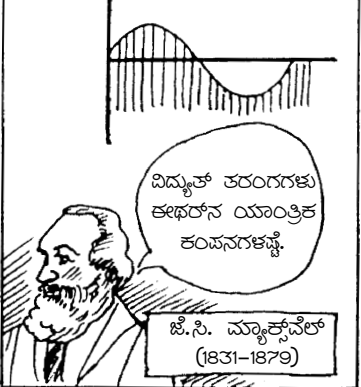
లెజ్జగతి విశ్లేషణలో...



లెజ్జగతి ఒక రీతియ జలనో

ఎల్. బోల్ట్స్మాన్ (1844-1906)

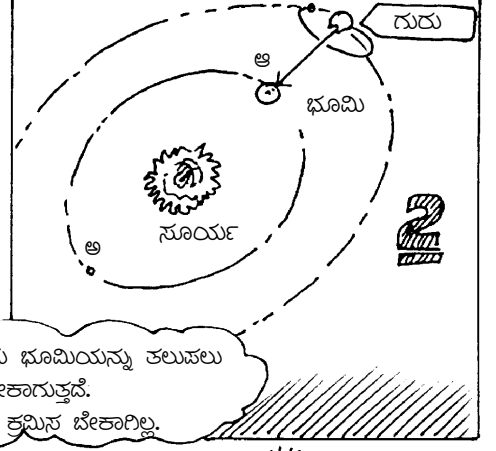
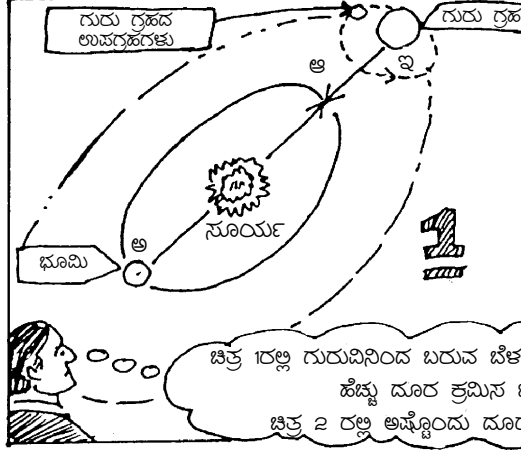
విద్యుత్ కర్మాంశంలో...



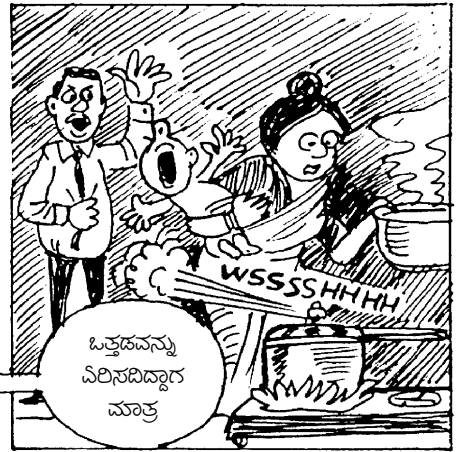
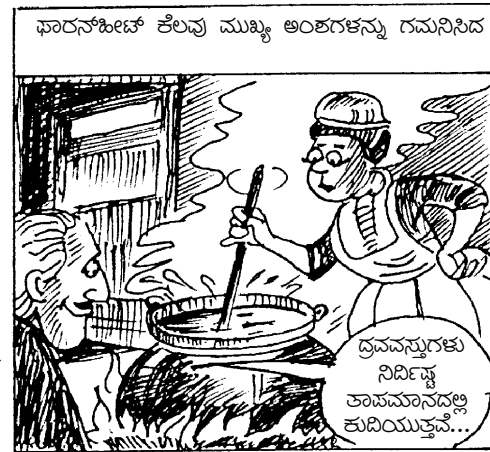
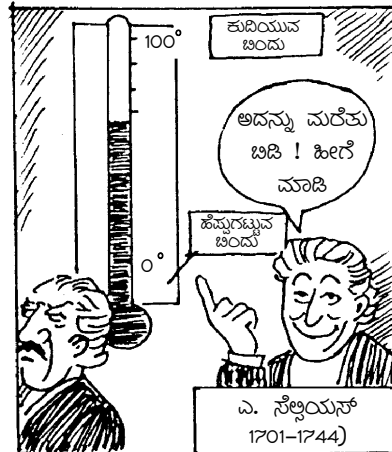
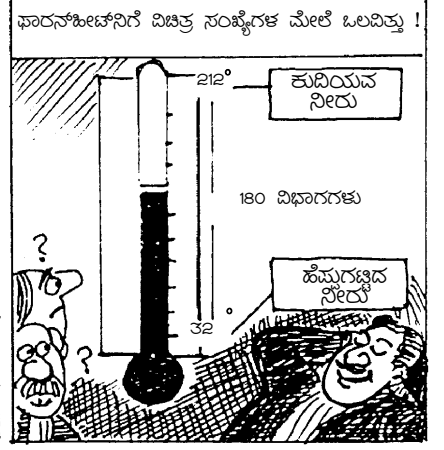
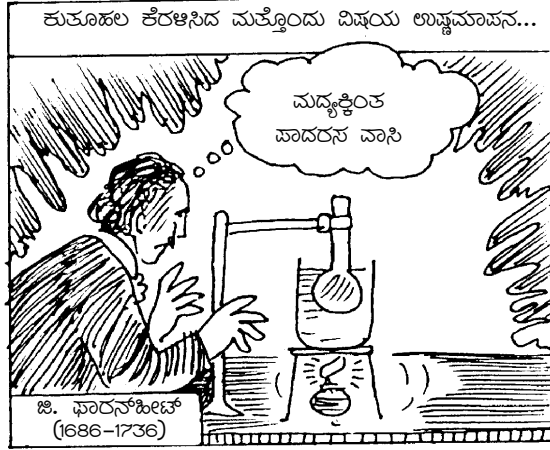
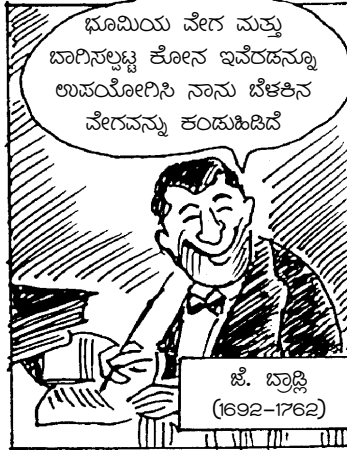
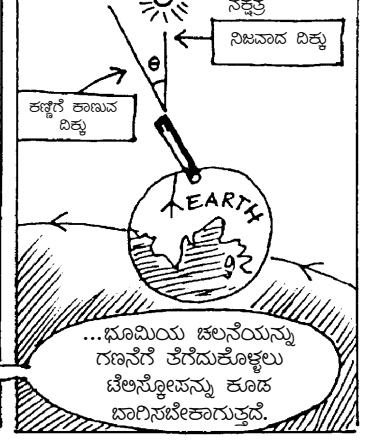
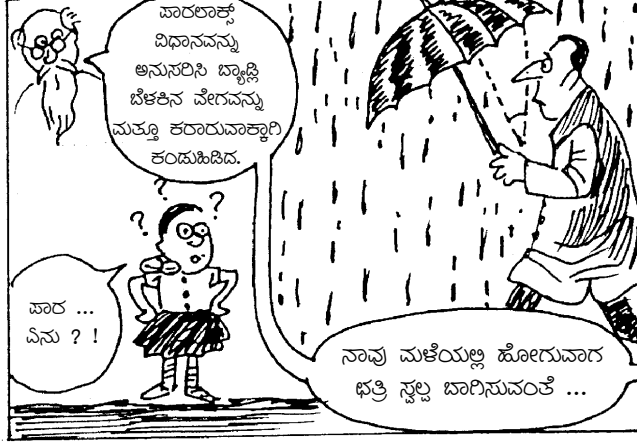
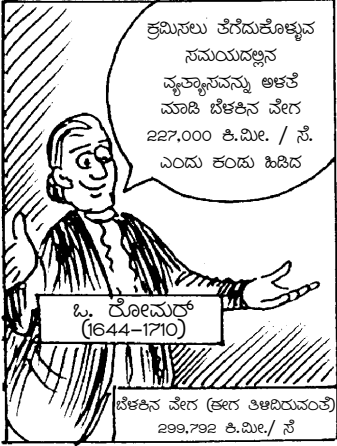
విద్యుత్ కర్మాంశం కూడా యాంత్రిక కంపనలకట్టే.

జి.సి. మ్యాక్స్వెల్ (1831-1879)

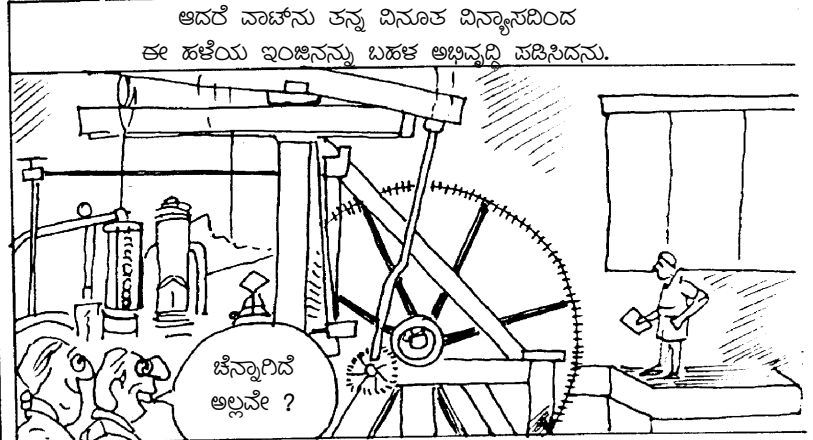
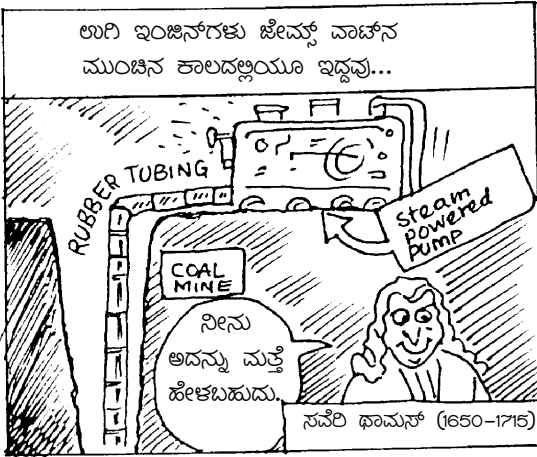
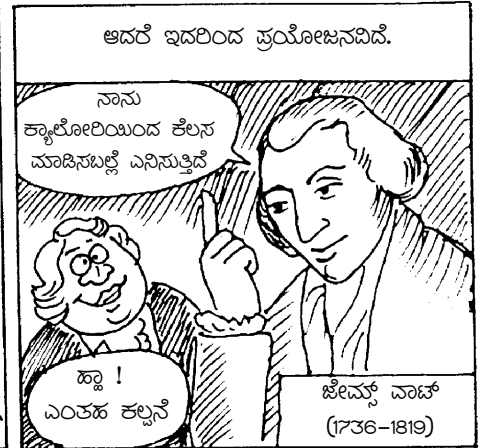
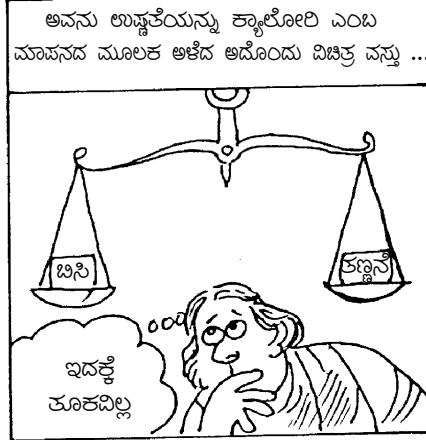
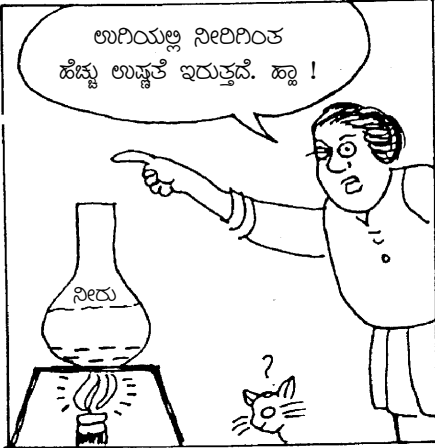
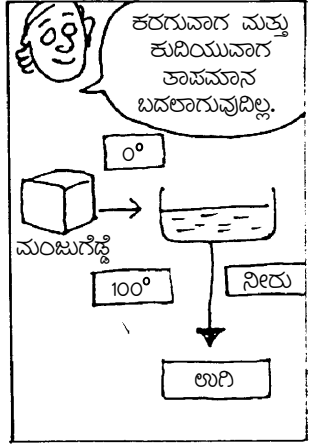
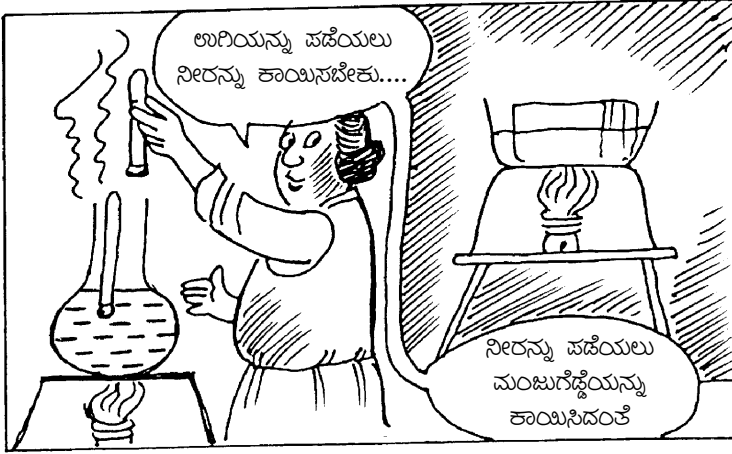
న్యూటన్ నంరద
కాలదల్లి డలవు
మడత్తరవడ
బేకవణిగేగకు ఆదవు.
రొమర్ బేకకిన
వేగవన్న అకడ



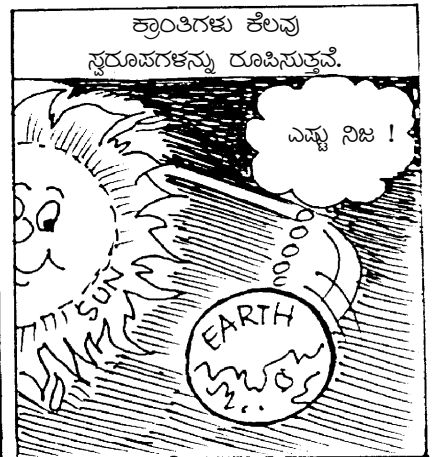
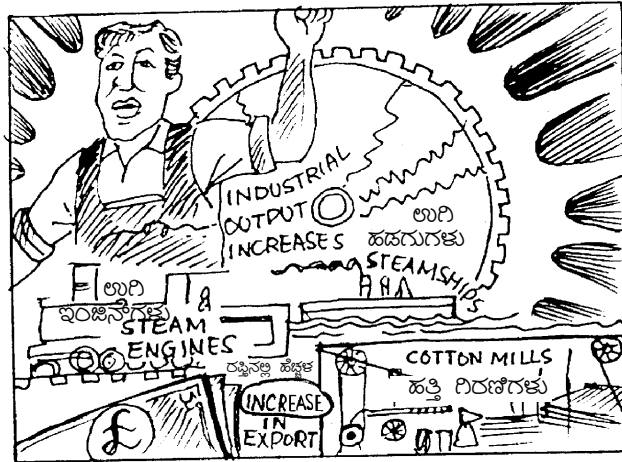
జిత్ర 1రల్లి గురుదిసింద బరువ బేకకు భూమియన్న తలువలు
డేడ్డు దూర క్రమిస బేకాగుత్తడే.
జిత్ర 2 రల్లి అషేండు దూర క్రమిస బేకారిల్లి.

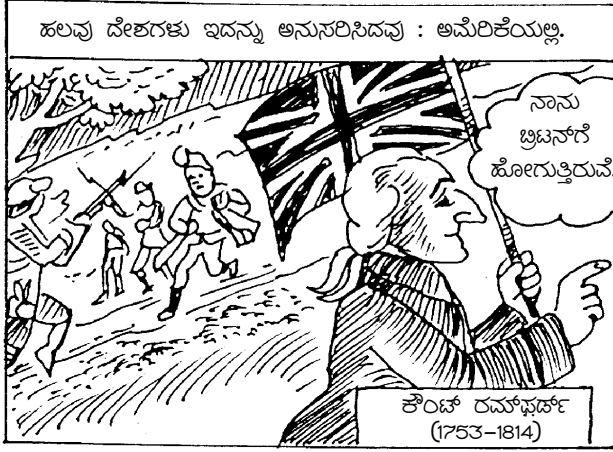


ಉಷ್ಣತೆ ಎಂದರೆ
ತಾಪಮಾನವಷ್ಟೆ ಅಲ್ಲ
ಎಂದು ಮೊದಲು
ಗುರುತಿಸಿದವನು
ಜೋಸೆಫ್ ಬ್ಲಾಕ್
(1729-1799)

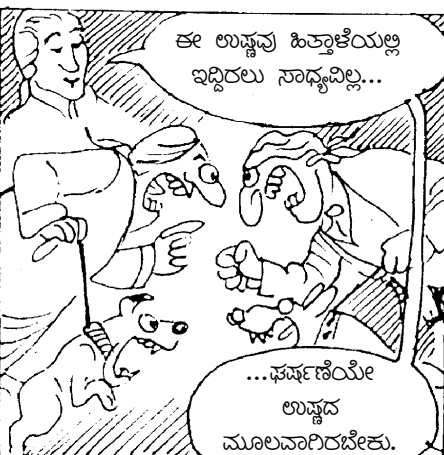
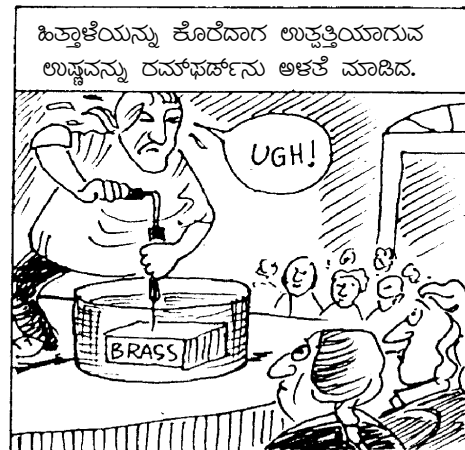
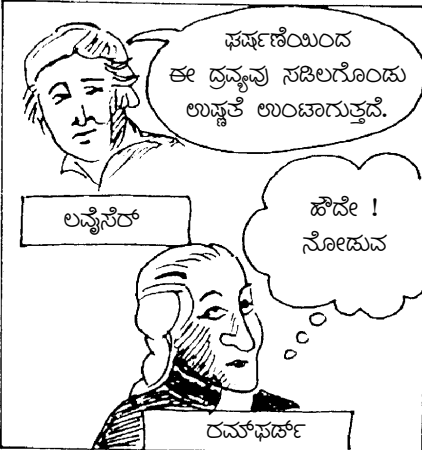
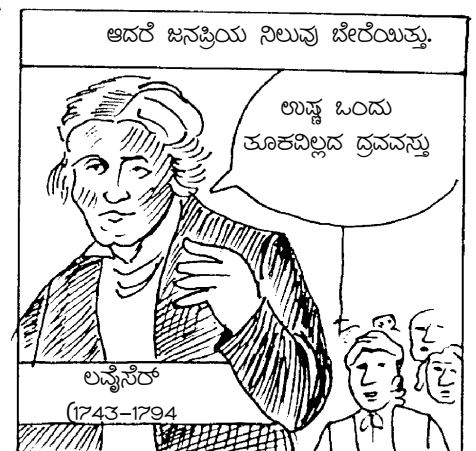
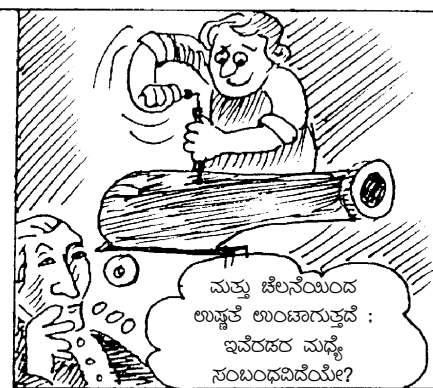
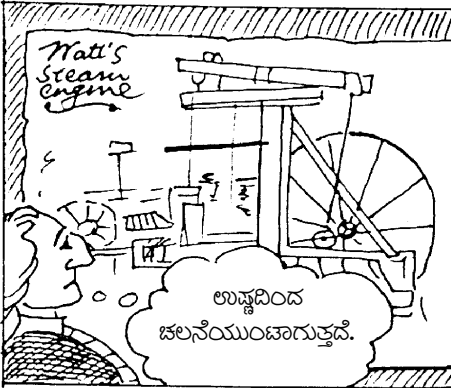


1780 ರ ಹೊತ್ತಿಗೆ
ಉರಿ ಶಕ್ತಿಯನ್ನು
ವಿವಿಧ ರೀತಿಯ
ಉದ್ಯಮಗಳಲ್ಲಿ
ಉಪಯೋಗಿಸಲಾಗುತ್ತಿತ್ತು.
ಇದು ಕೈಗಾರಿಕಾ ಕ್ರಾಂತಿಗೆ
ನಾಂದಿಯನ್ನು ಹಾಕಿತು.

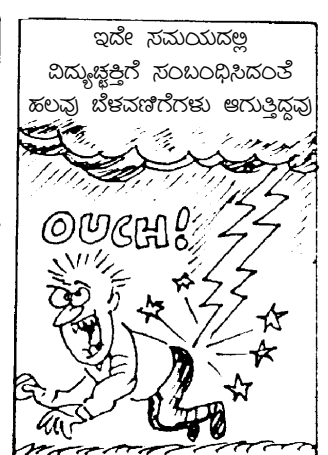




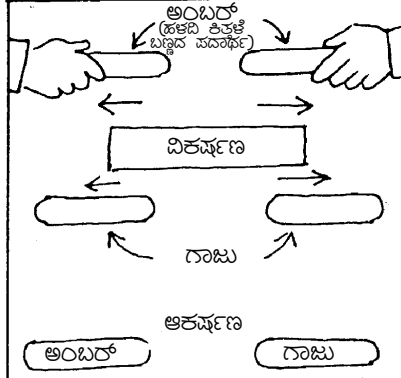
ಇವೆಲ್ಲದರ ಮಧ್ಯೆ ಕೌಂಟ್ ರಮ್‌ಫರ್ಡ್‌ನು ಉಷ್ಣದ ನೈಜ ಸ್ವರೂಪದ ಬಗ್ಗೆ ಗಂಭೀರ ಚಿಂತನೆ ನಡೆಸಿದ.



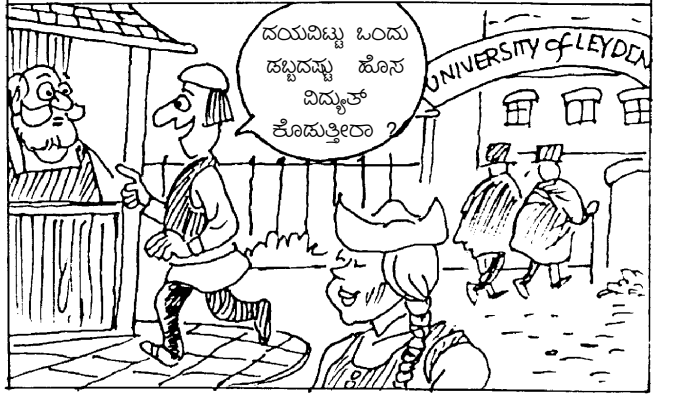
ಲವೈಸೆರ್‌ನ ವಾದವು ಶಪ್ಥೆಂದು ಪ್ರತಿಪಾದಿಸಿದ ನಂತರ ರಮ್‌ಫರ್ಡ್‌ನು ವಿಧವೆ ಯಾರಿದ್ದ ಲವೈಸರ್‌ನ ಪತ್ತಿಯನ್ನು ಮದುವೆಯಾದನು ಅದರ ಸ್ವಲ್ಪ ಸಮಯದಲ್ಲಿ ಈ ಮದುವೆ ಮುರಿಮಾಡಿತ್ತು.



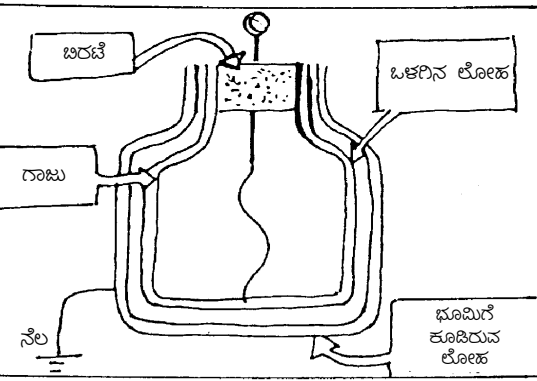
ಹದಿನೆಂಟನೇ ಶತಮಾನದ ಹೊತ್ತಿಗೆ ಪ್ರಕೃತಿಯಲ್ಲಿ ಎರಡು ರೀತಿಯ ವಿದ್ಯುತ್ ಇದೆ ಎಚ್ಚಿರುತ್ತಿತ್ತು.



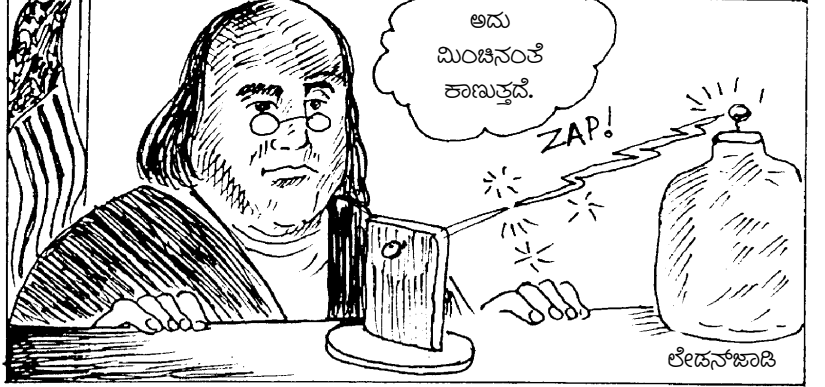
ಜನರಿಗೆ ವಿದ್ಯುತ್‌ನ್ನು ಹೇಗೆ ಶೇಖರಿಸಿರುವುದು ಎಂದೂ ಕೂಡ ತಿಳಿದಿತ್ತು.



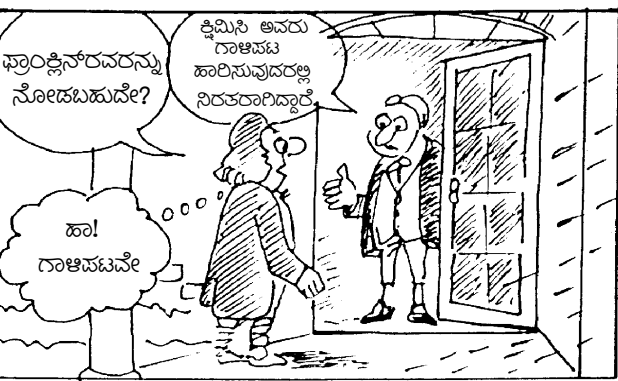
ಲೇಡನ್ ಜಾಡಿಯಲ್ಲಿ ಗಾಜಿನಿಂದ ಬೇರ್ಪಡಿಸಲ್ಪಟ್ಟ ಎರಡು ಲೋಹಗಳಿರುತ್ತವೆ. ಒಳಗಿನ ಲೋಹವು ವಿದ್ಯುದಾವೇಶವನ್ನು ಹೊಂದಿರುತ್ತದೆ.



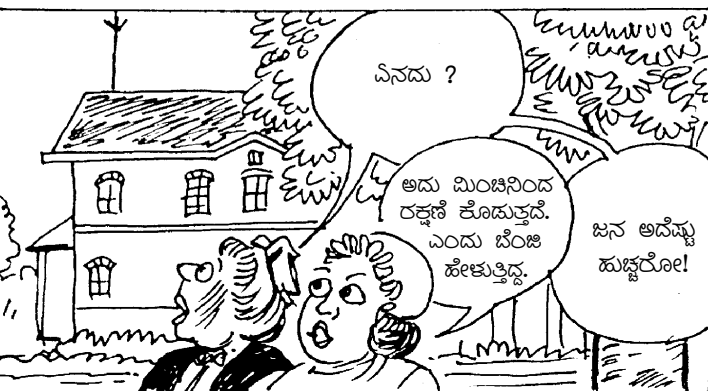
ಲೇಡನ್ ಜಾಡಿಗಳೊಂದಿಗೆ ಪ್ರಯೋಗಗಳನ್ನು ನಡೆಸುತ್ತಿದ್ದ ವಿಜ್ಞಾನಿಗಳಲ್ಲಿ ಬೆಂಜಮಿನ್ ಫ್ರಾಂಕ್ಲಿನ್ ಕೂಡ ಒಬ್ಬ (1706-1790)



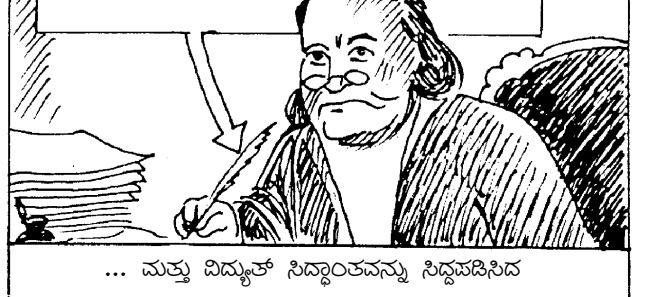
ಫ್ರಾಂಕ್ಲಿನ್‌ನು ಮಿಂಚು ನಿಜವಾಗಲೂ ವಿದ್ಯುತ್‌ನಿಂದ ಸಂಭವಿಸುವ ಸಂಗತಿಯೇ ಎಂದು ಪರೀಕ್ಷಿಸಲು ಪ್ರಾರಂಭಿಸಿದ.

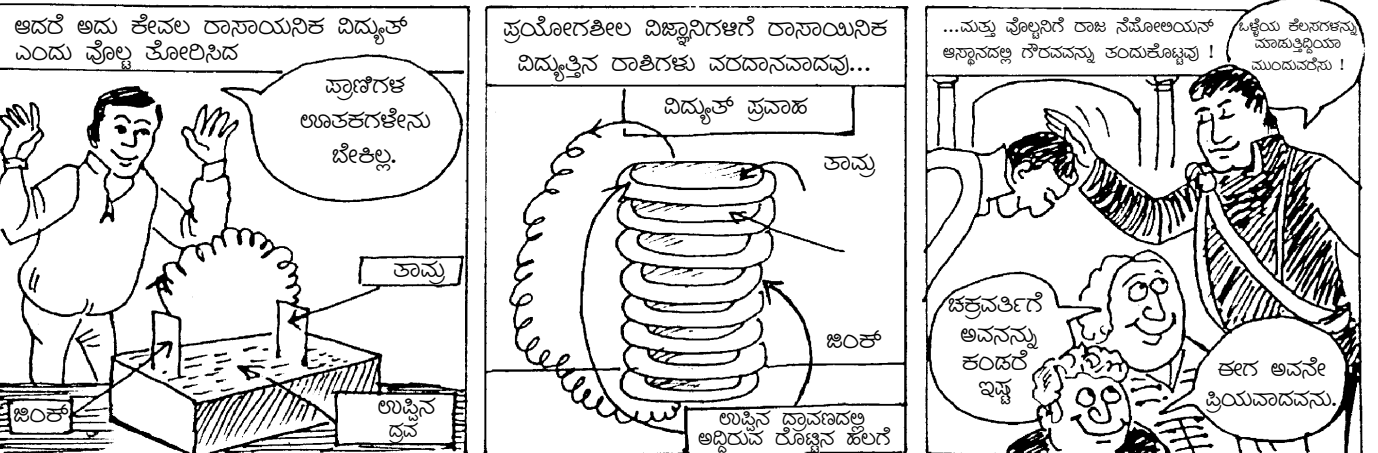
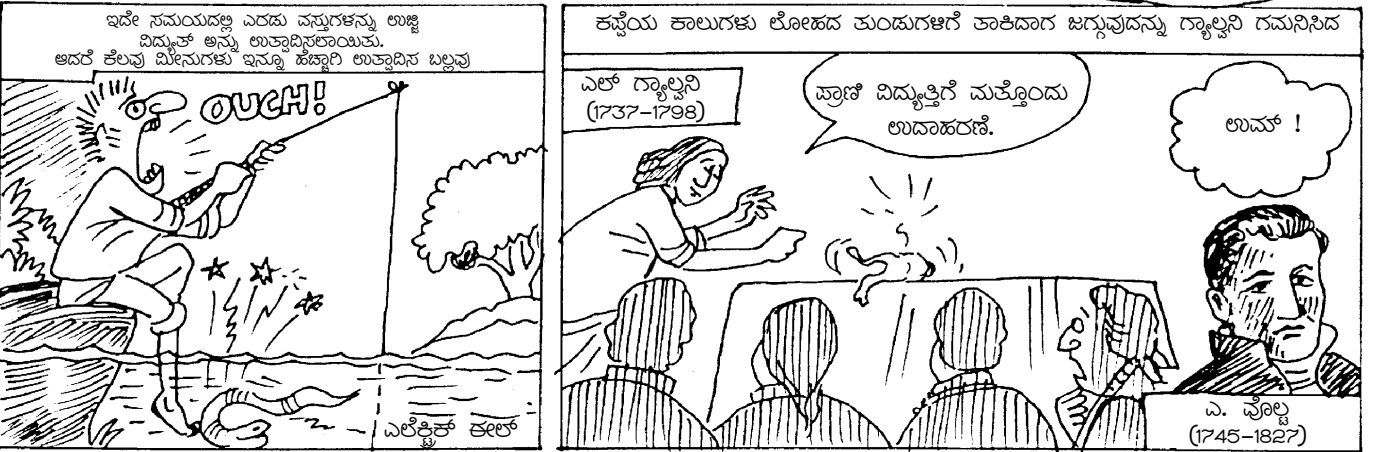
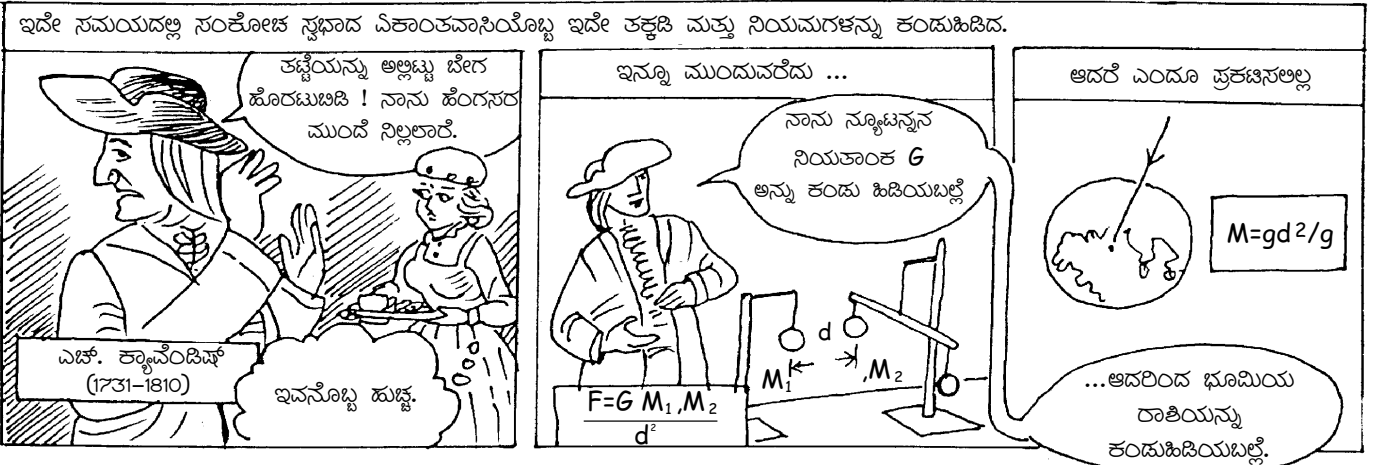
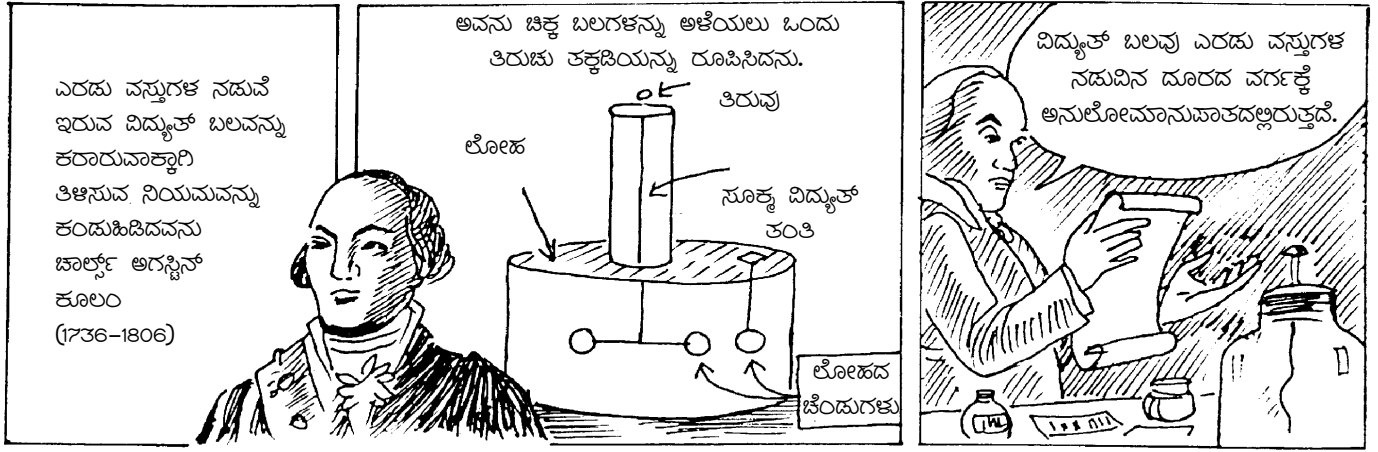


ಫ್ರಾಂಕ್ಲಿನ್‌ನು ಮೊದಲ ಮಿಂಚು ಭಂಧಕವನ್ನು ಕಂಡುಹಿಡಿದನು...



ವಿದ್ಯುತ್ ತರಲವು ಹೆಚ್ಚಕ (+) ಅಥವಾ ಕೊರತೆ (-) ಆಗಿರಬಹುದು. ಹೆಚ್ಚಕವು ಕೊರತೆಯನ್ನು ಆಕರ್ಷಿಸುತ್ತದೆ.



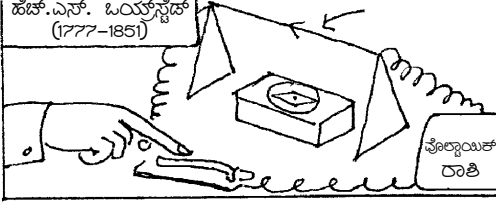


ఫోల్డాయిస్
రాతియింద
విద్యుత్
ప్రయోగరకన్ను
నడిచువుదు
సలభవాయితు.
ఇదరింద

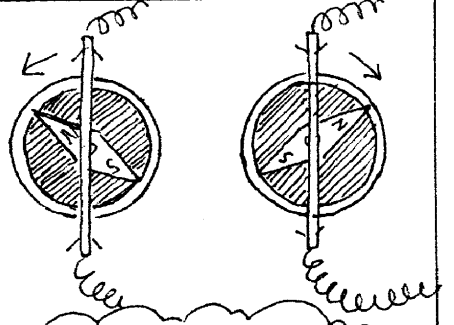
విద్యుత్ మత్తు కాంతత్వ ఎరడన్ను ఒగ్గొడినలు
కూడ సాధ్యవాయితు.



జే.ఎస్. ఒయ్యస్సేడ్
(1777-1851)



ఫోల్డాయిస్
రాతి



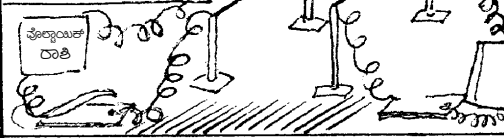
ప్రవాహద దిక్కిగే తక్కుంకే
సూజియూ వాలుత్తదే.

కల ప్రయోగవన్ను కలవరు నడిచిదరు.

ఇవరల్ల ముఖ్యవాదవన్ను ఆంపియర్
ఒందు ప్రవాహ మత్తేందర
మేలే పరిణామ
బిరుత్తదేయే.

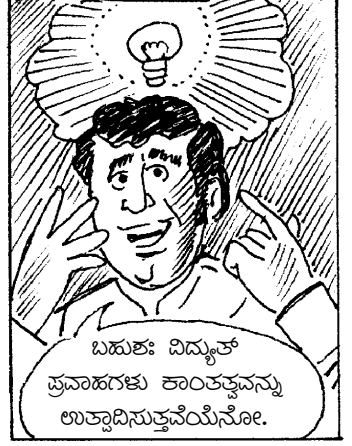
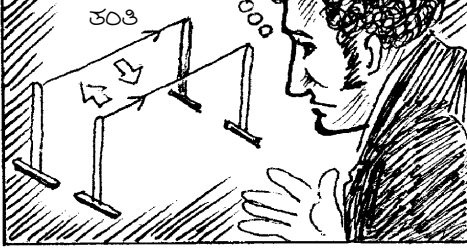


ఎ.ఎం. ఆంపియర్
(1775-1836)

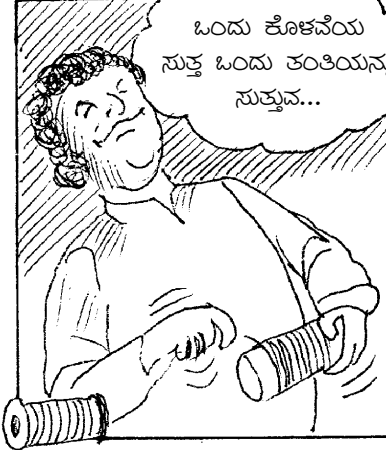


జోడు ! పరిణామ బిరుత్తదే.

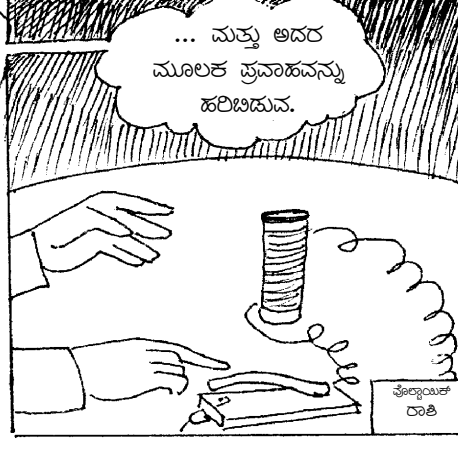
ప్రవాహరకు ఒండే దిక్కినల్లదాగ
తంతిరకు పరస్పర
ఆకర్షినుత్తదే.



ఒందు కేలకవేయ
సుత్త ఒందు తంతియన్ను
సుత్తవ...

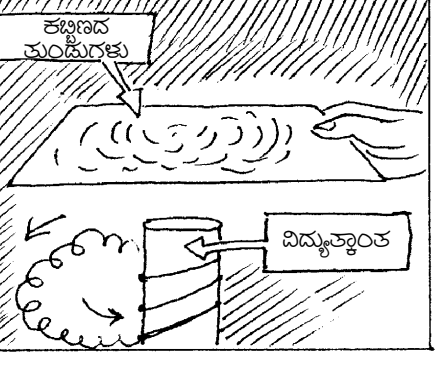


... మత్తు అదర
మూలర ప్రవాహవన్ను
కరిబిడువ.

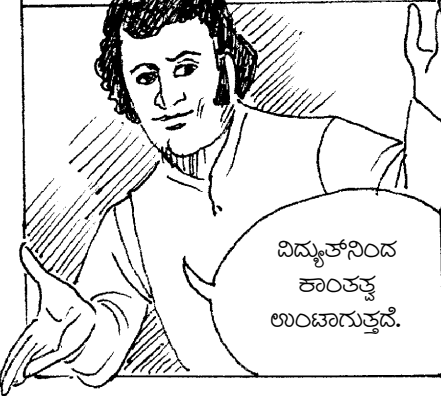


ఫోల్డాయిస్
రాతి

ఆత్మయవేందరే కేలకవేయ ఒందు
బార మ్యాగ్నెటిజంకే వత్తిసితు !

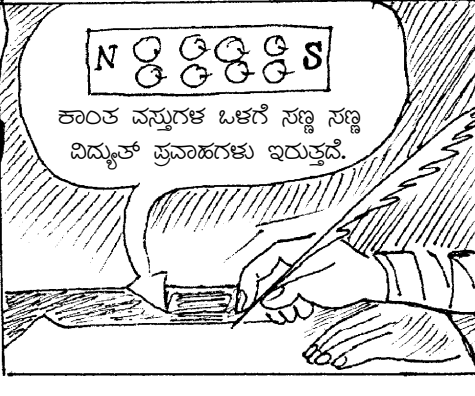


ఇదు విజ్ఞానద ఇతిహాసదల్లె
ఒందు ప్రముఖ మ్మేలగల్లు



విద్యుత్తనింద
కాంతత్వ
లుండగుత్తదే.

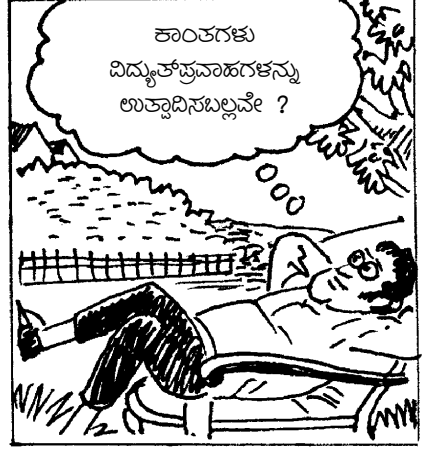
ఆంపియర్ కాంతత్వద బగ్గే సరియారి లూపిసిద

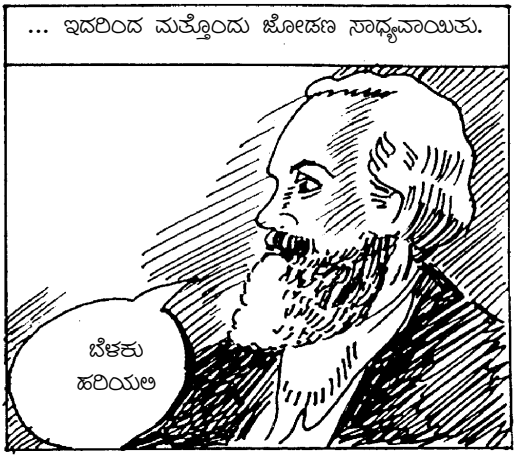
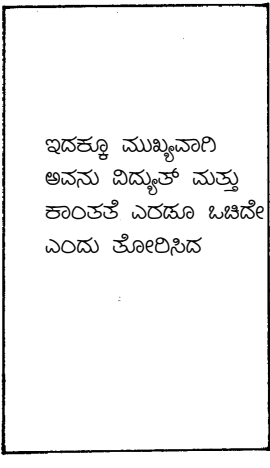
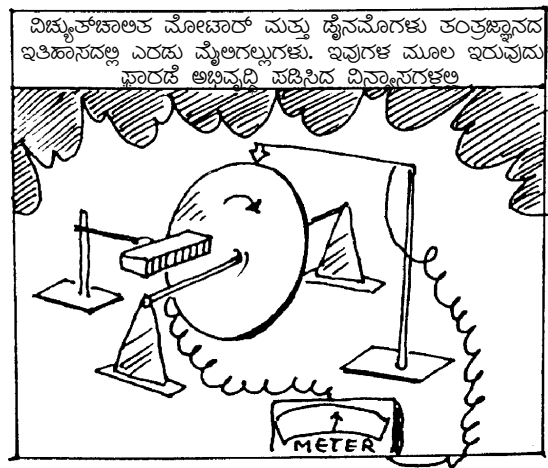
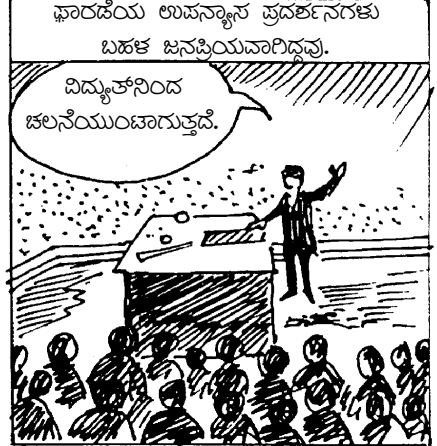
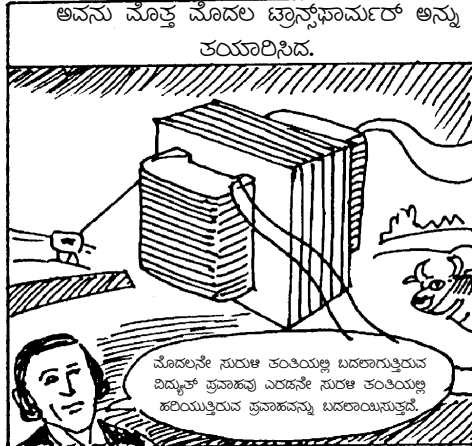
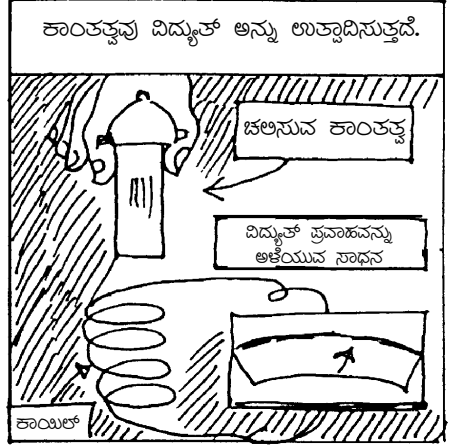
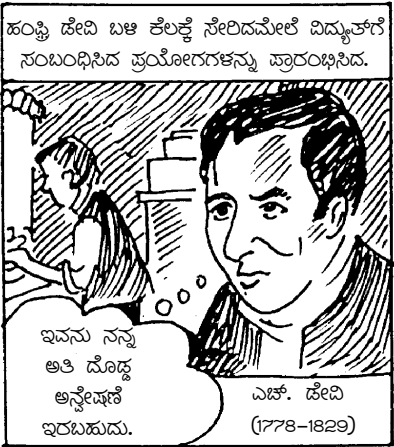
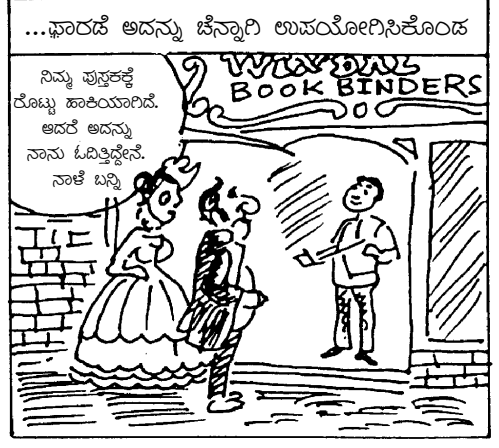
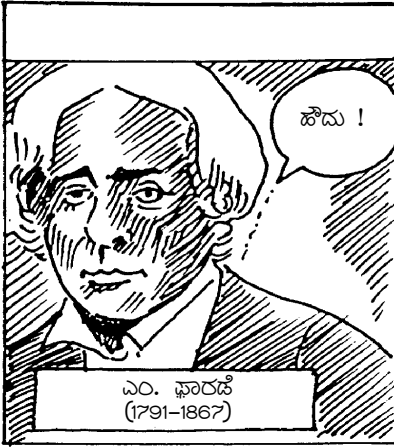


N S

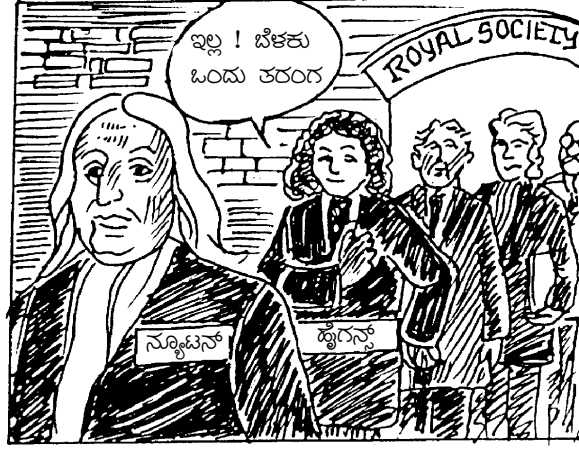
కాంత వస్తురక ఒకగే నల్ల నల్ల
విద్యుత్ ప్రవాహరకు ఇరుత్తదే.

కాంతరకు
విద్యుత్ ప్రవాహరకన్ను
లుత్తాదినబల్లవే ?

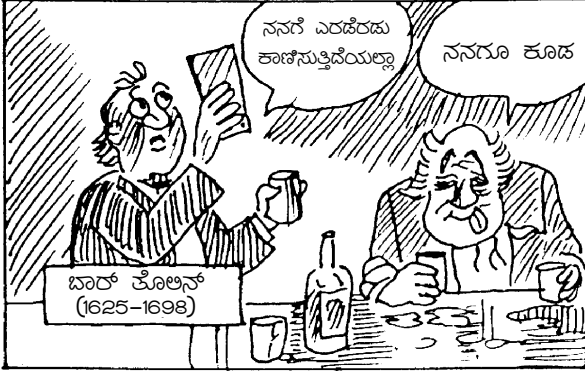




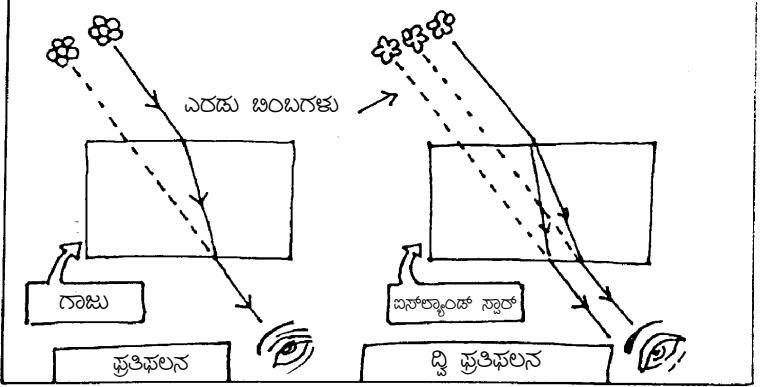
నావు హిందే
 హేళిదంతే బేళకు
 కణగళింద ఆగిదే ఎందు
 న్యూటన్ నంబిడ్డ
 స్వప్నవాద నేరకు
 బిళికువుదక్కే
 ఇదే కారణ ఎందు
 అవన వాద.



ఎల్లదక్కూ దివరణే కేదబల్లదే? ఇల్ల! ఈ ఐసోల్యాండ్
 స్టూర్ తరళిన్ల స్త్రు నమస్కే ఇదేయల్లా



ఐసోల్యాండ్ స్టూర్ బేళకన్ను ఎరడు మూలగళారి విభజిసితు.



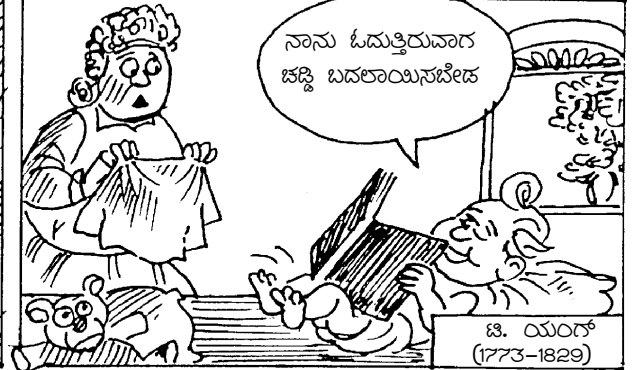
... ఇదన్న వివరినలు న్యూటన్
 సాధ్యవారల్ల.



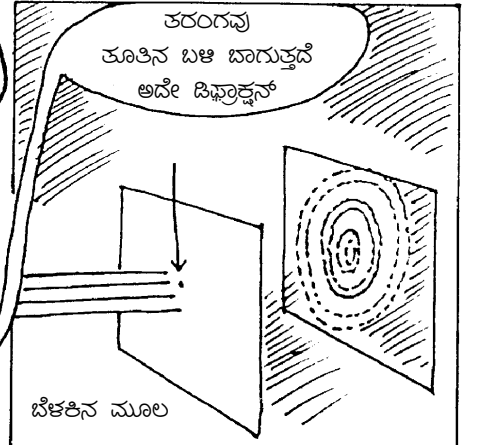
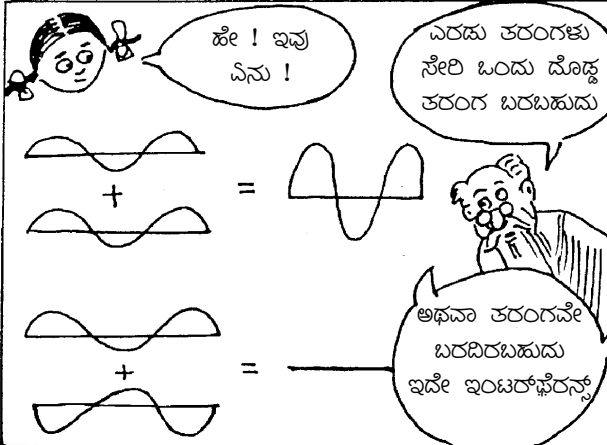
డ్యూరన్ కూడ !

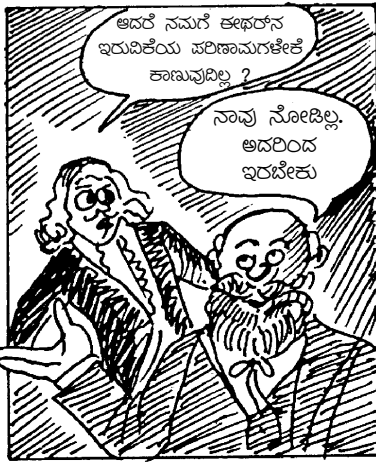
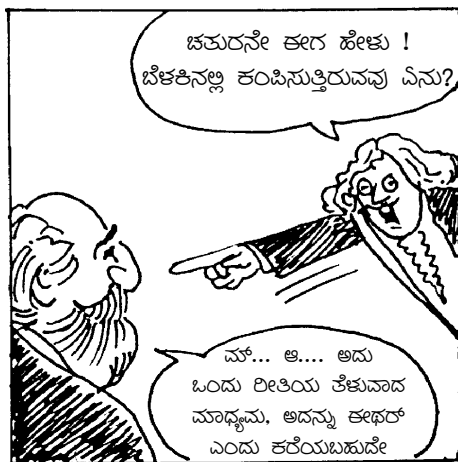
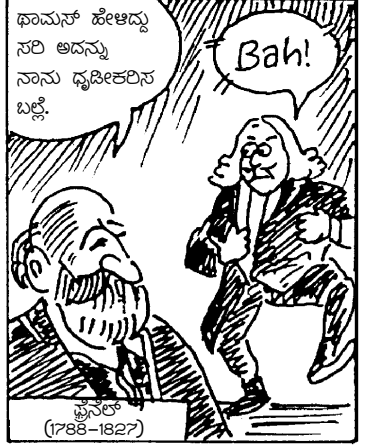
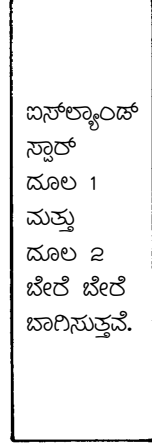
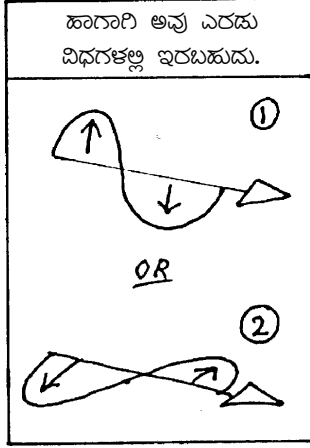
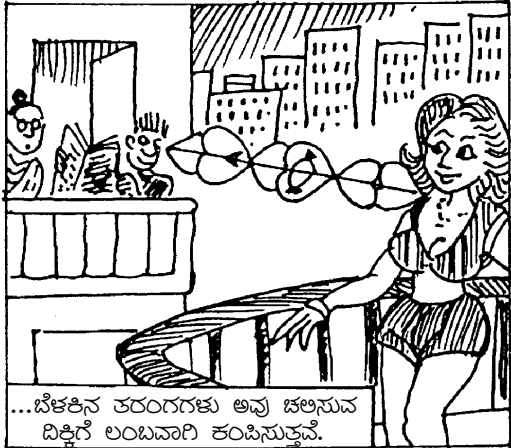
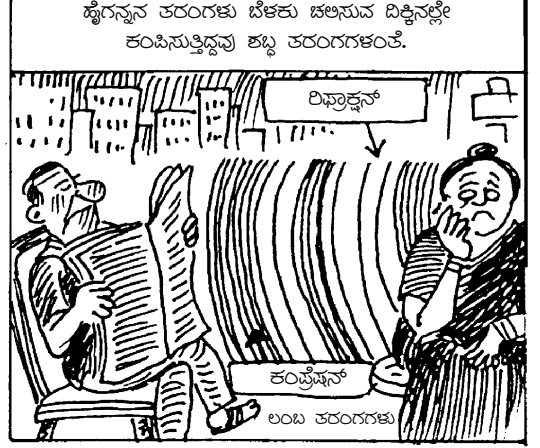
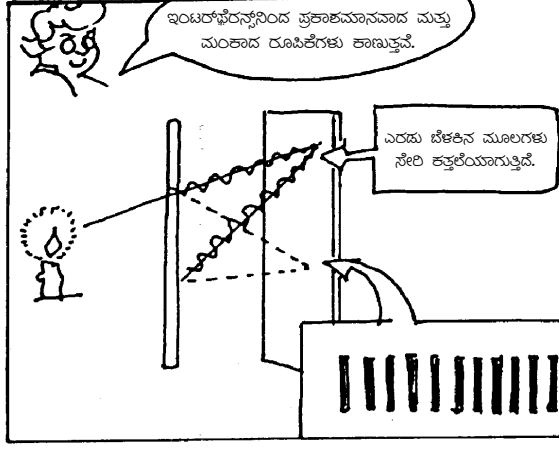
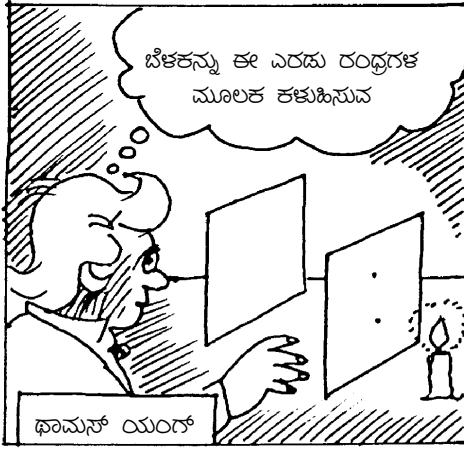


ఈ విషయగళు థామస్ యంగ్ ఎంబ ప్రకండ బుద్ధివంకన
 కాలదవరేగూ హాగేయే లుళిదిన్న.



జేలిసుత్తిరువ
 బేళకిన కిరణగళల్లి
 ఇంటర్ఫరెన్స్ మత్తు
 డిఫ్రాక్షన్ ఆగుత్తవే
 ఎందు తోలెరిసిద
 థామస్ యంగ్





జేమ్స్ మ్యాక్స్వెల్
(1831-1879)
బేకరిన స్వరూపద మేలే
బేకకు జేల్లద మేధావి

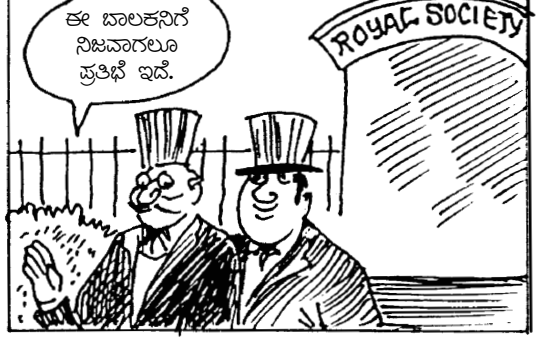
మత్తోబ్బ ప్రశంస బుద్ధివంత.



థ్ థ్ !

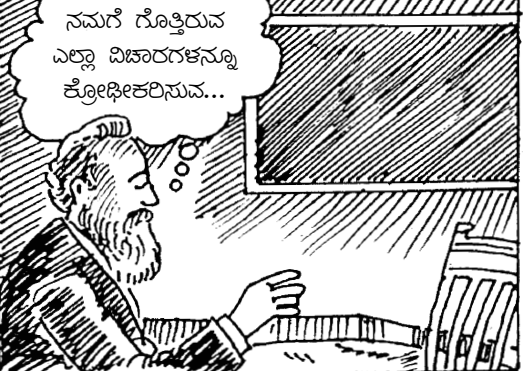
దాఫి
మ్యాక్స్వెల్
థ్ థ్ !

అవను 15 వషడ బాలకనారిద్దగ
రాయల్ సోసైటీ ఆఫ్ ఎడిస్ బర్రోనల్లి
మోదల సంశోధనా ప్రభందవన్ను ఓదిద

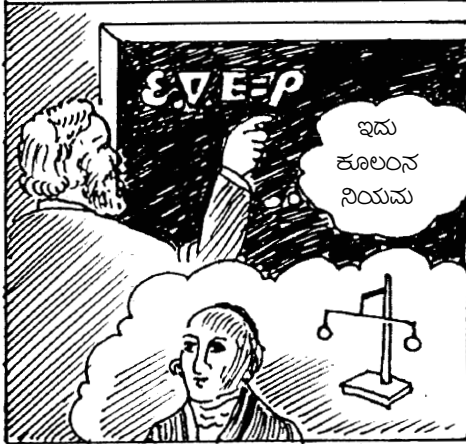


కే బాలకనిగే
నిజవారలూ
ప్రతిభే ఇదే.

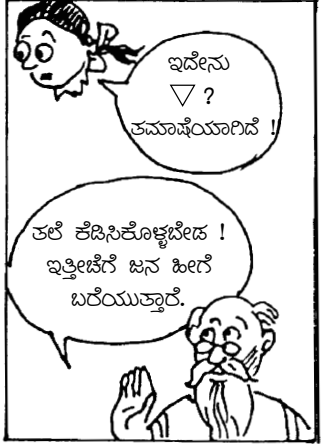
ముందే అవను విద్యుత్కాంతకేయి మేలే
అకవాద సంశోధనే నడిసిన...



నమగే గోత్తిరువ
ఎల్లా విజారగకన్ను
శోధిచెరిను...

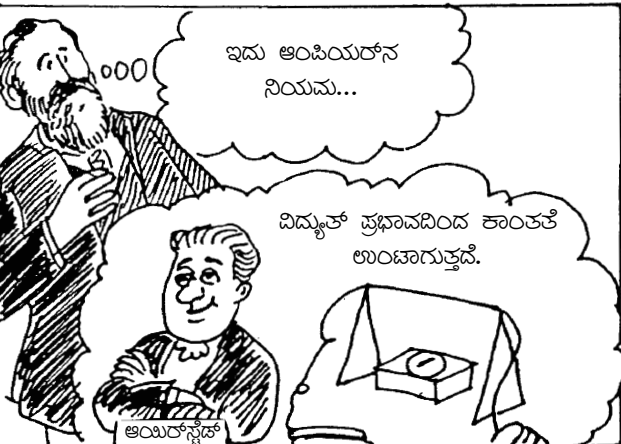


ఇదు
కులంన
నియమ



ఇదేను
 ∇ ?
కమాషోయారిదే !

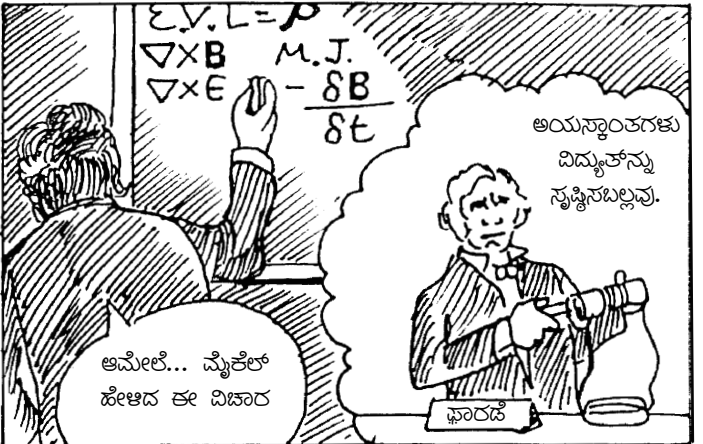
కలే కేదిసిశోళ్ళబేడ !
ఇత్తిబేగే జన హిగే
బరేయిక్కారే.



ఇదు అంపియరన్
నియమ...

విద్యుత్ ప్రభావదింద కాంతకే
ఊంజారుత్తదే.

అయిర్స్టాడ్



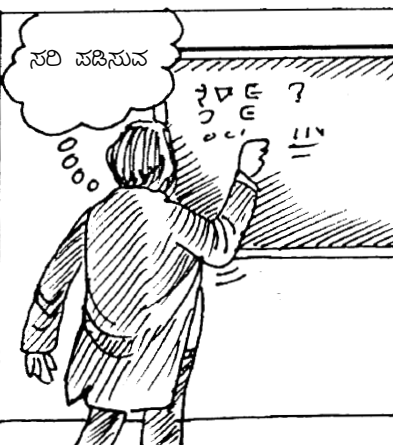
అమేలే... మ్మికేల్
ఠేళిద కే విజార

అయిస్కాంతగతు
విద్యుత్ను
సృష్టినబల్లవ.

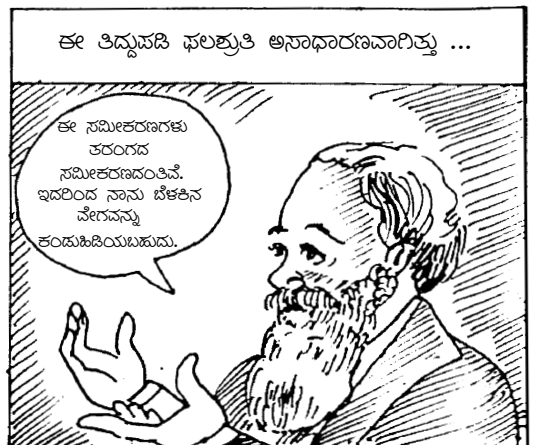
ఫారడే



అయ్యో !
ఏనో సరియిల్లవల్ల !



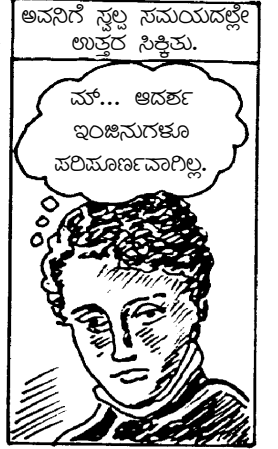
సరి పడినువ



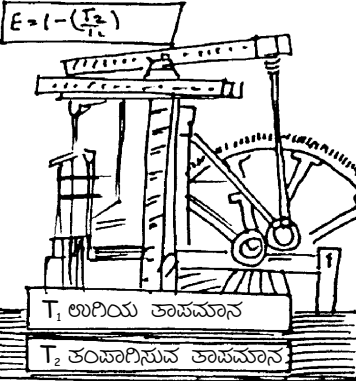
కే తిద్దుపడి ఫలత్రితి అనాధారణవారిత్తు ...

కే సమీకరణగతు
కరంగద
సమీకరణదంతివే.
ఇదరింద నాను బేకరిన
వేగవన్న
కందుశిరియబకుదు.

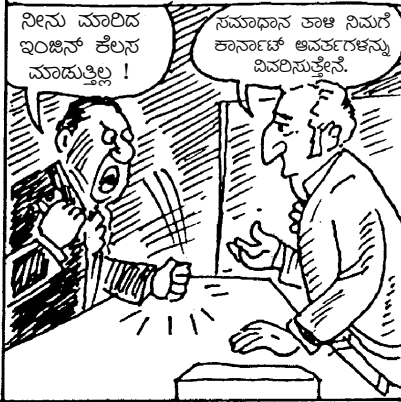
ಹಲವು ವಿಜ್ಞಾನಿಗಳು ನೇರಿ
ಉಷ್ಣ ಮತ್ತು
ಚಲನಶಾಸ್ತ್ರಗಳನ್ನು
ಒಗ್ಗೂಡಿಸಿದರು.
ಈ ಪ್ರಕ್ರಿಯೆಯನ್ನು
ಪ್ರಾರಂಭಿಸಿದವನು
ಸಾಬಿ ಕಾರ್ನಾಟ್



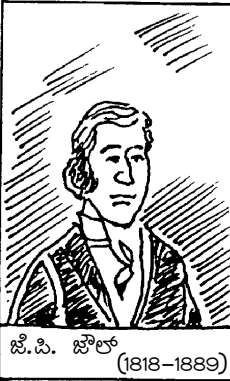
ಆದರ್ಥ ಇಂಜಿನ್‌ನ ದಕ್ಷತೆ
ಕೂಡ ಒಂದಕ್ಕಿಂತ ಕಡಿಮೆ !



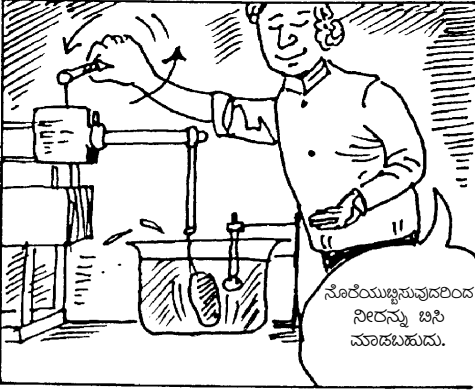
ಬಹಳಷ್ಟು ಇಂಜಿನ್‌ಗಳು ಜನರ ನಿರೀಕ್ಷೆಗೆ ತಕ್ಕಂತೆ ಇರಲಿಲ್ಲ.



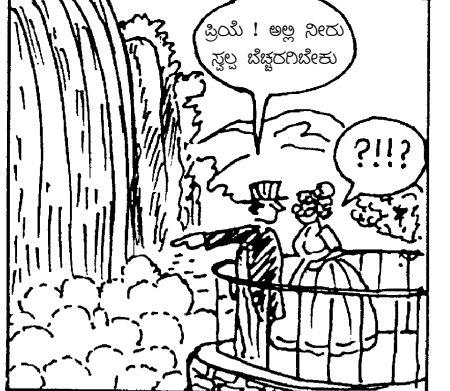
ಉಷ್ಣ ಮತ್ತು ಚಲನೆಗೂ ನಡುವಿನ ಸಂಬಂಧದ
ಅಧ್ಯಯನವನ್ನು ಮತ್ತೆ ಕೆಲವರು ಮುಂದುವರಿಸಿದರು.



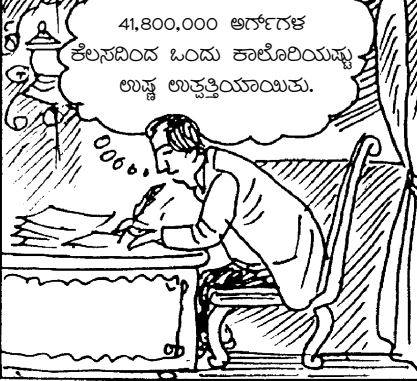
ಥೋಮ್ಸ್ ಯಾಂತ್ರಿಕ ಚಲನೆಯಿಂದ ಉತ್ಪತ್ತಿಯಾದ ಉಷ್ಣವನ್ನು ಕರಾರುವಕ್ಕಾಗಿ ಅಳೆದ...



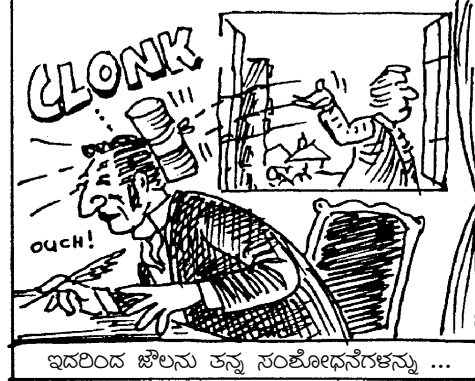
...ಮತ್ತು ವೈಜ್ಞಾನಿಕ ಮಧುಪದ್ರಕ್ಕೂ ಹೋಲಿದ್ದ !



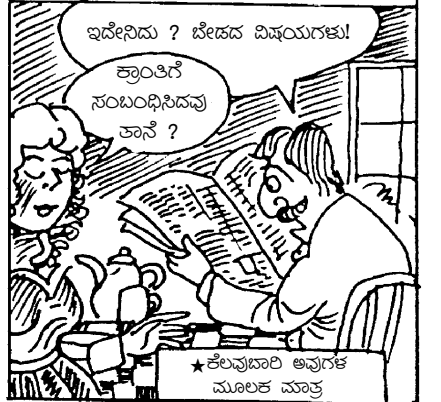
ಕೊನೆಗೆ ಸೂತ್ರರೂಪದಲ್ಲಿ
ಸಿದ್ಧಾಂತವೊಂದನ್ನು ನಿರೂಪಿಸಿದ...

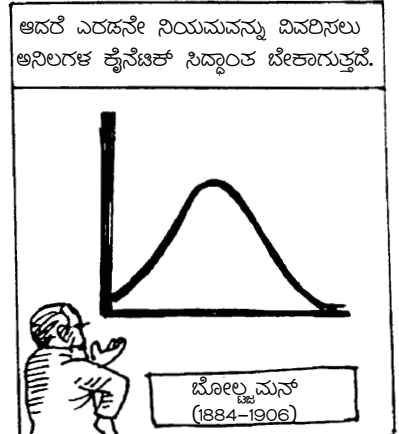
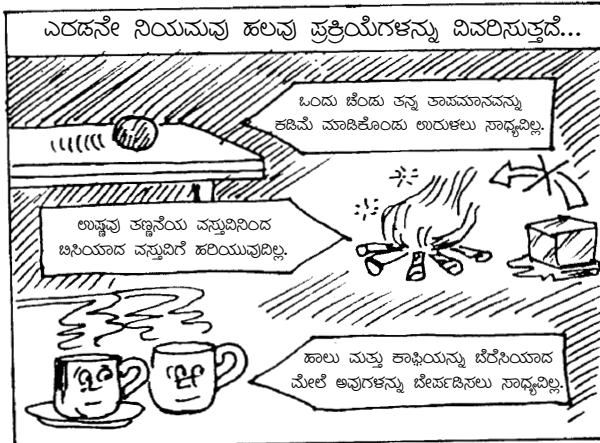
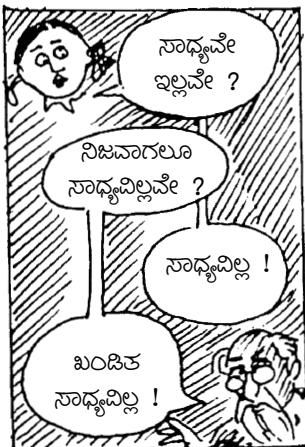
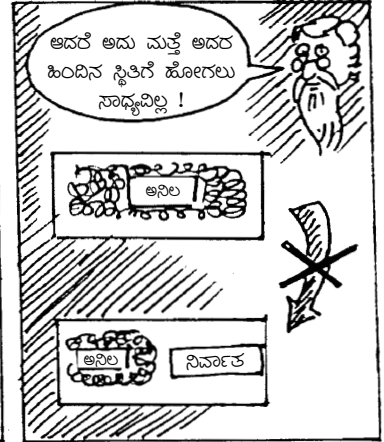
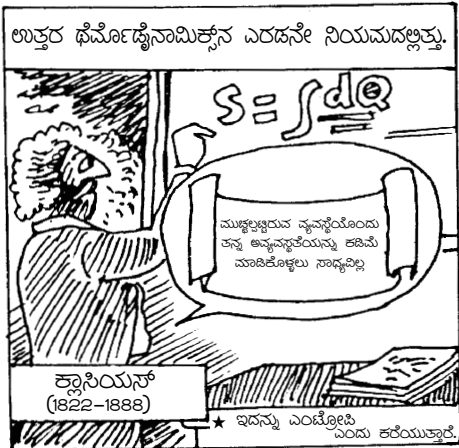
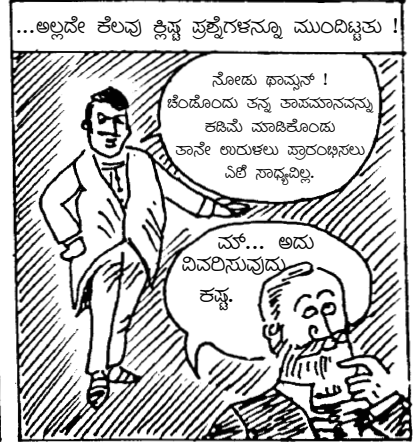
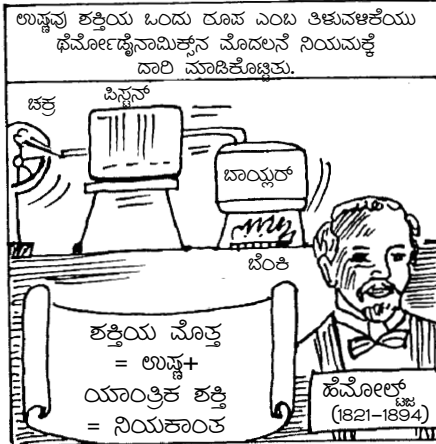
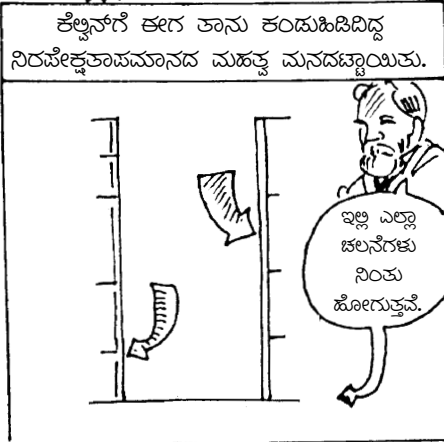
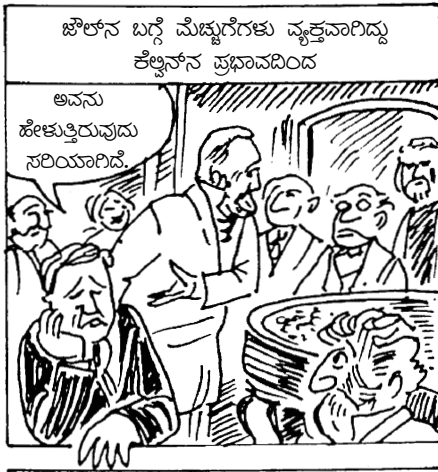


... ಇದನ್ನು ಶಕ್ತಿ ಸಂರಕ್ಷಣೆಗೆ ಸಂಬಂಧಿಸಿದ
ಪತ್ರಿಕೆಗಳು ತಿರಸ್ಕರಿಸಿದವು.

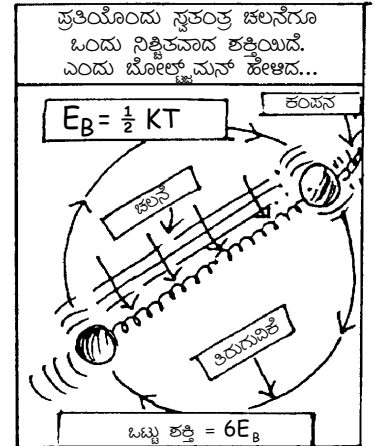
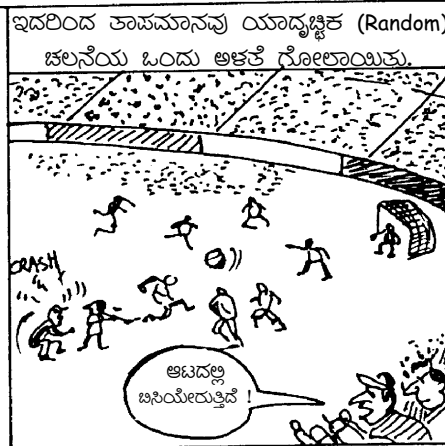
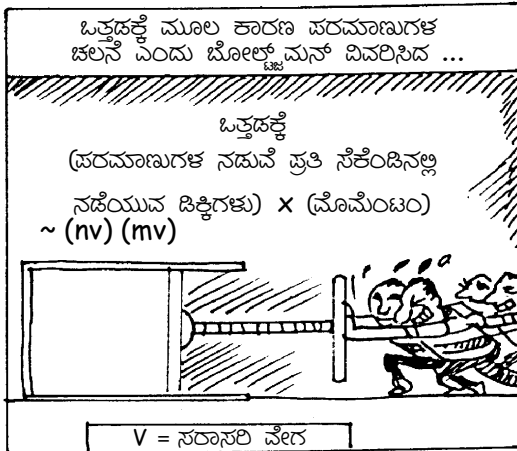
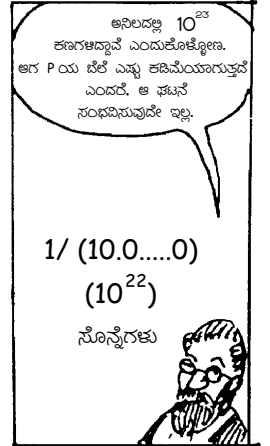
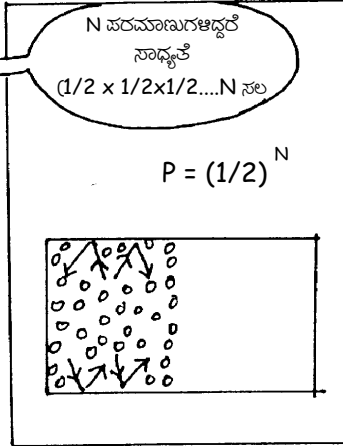
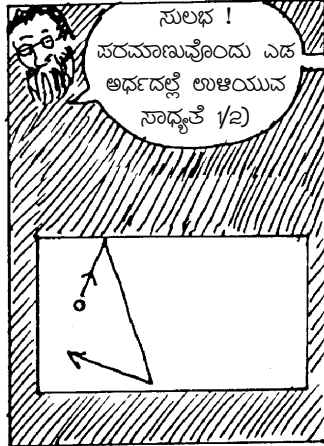
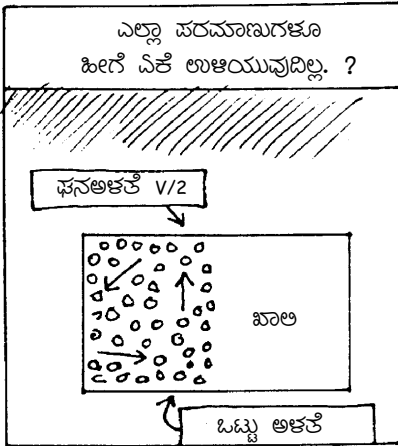
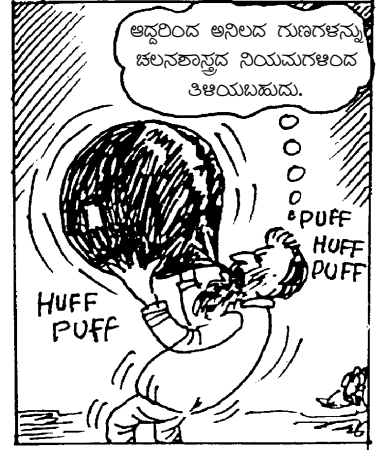
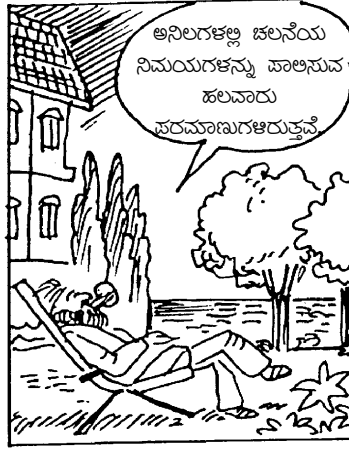
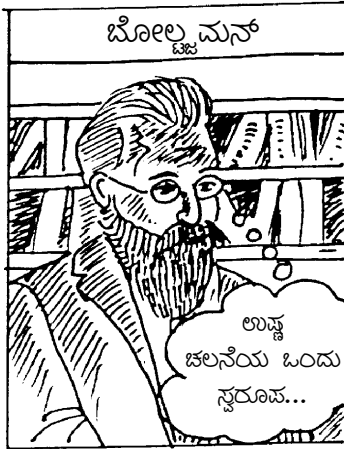


...ವಾರ್ತಾ ಪತ್ರಿಕೆಗಳ ಮೂಲಕ ತಿಳಿಸಬೇಕಾಯಿತು.

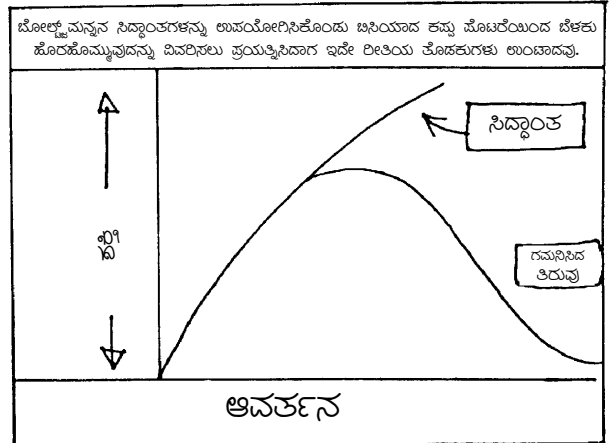
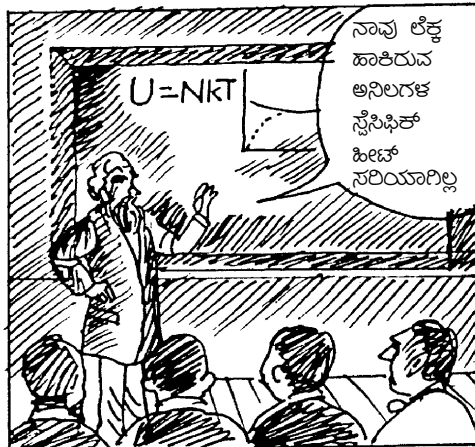




ಮಾಕ್ಸ್‌ವೆಲ್ ಮತ್ತು ಇತರ ವಿಜ್ಞಾನಿಗಳ ಸಂಶೋಧನೆಗಳಿಂದ ಉಷ್ಣಶಾಸ್ತ್ರ ಮತ್ತು ಚಲನಶಾಸ್ತ್ರಗಳ ನಡುವಿನ ಸಂಬಂಧವನ್ನು ಸಂಪೂರ್ಣವಾಗಿ ಅರ್ಥಮಾಡಿಕೊಳ್ಳಲು ಸಾಧ್ಯವಾಯಿತು.



...ಇದರಿಂದ ಹಲವು ಸಂಗತಿಗಳನ್ನು ವಿವರಿಸಲು ಸಾಧ್ಯವಾಯಿತು. ಆದರೆ ಕೆಲವು ವಿಷಯಗಳು ಪ್ರಶ್ನೆಗಳಾಗಿಯೇ ಉಳಿದವು.



ಒಂದು ಮೊಟರೆಯಲ್ಲಿ ಬೆಳಕಿಗೆ
ಲಭ್ಯವಿರುವ ಕಂಪನ
ಪರಿಗಣಿಸಿ ಲೆಕ್ಕ ಹಾಕಿದ

ಕರಂಗಾಂತರಗಳು
2L, 2L/2, 2L/3...
2L/10...2L/1000...
ಹೀಗೆ ಅನಂತ್ಯಾಂತ ಕರಂಗಗಳು
ಇರಬಹುದು.

ಲಾರ್ಡ್ ರೇಲಿ
(1842-1919)

...ಪ್ರತಿಯೊಂದು ಕರಂಗಾಂತರದಲ್ಲೂ
ಅಷ್ಟು ಶಕ್ತಿ ಇದ್ದರೆ ಮೊಟರೆಯಲ್ಲಿ
ಲೆಕ್ಕಹಾಕಲು ಸಾಧ್ಯವಿಲ್ಲದಷ್ಟು
ಶಕ್ತಿ ಇರಬೇಕಾಗುತ್ತದೆ.

$E = \frac{1}{2} k T d v$

ಇದು
ಸರಿಯಲ್ಲವಲ್ಲಾ !

ಅಷ್ಟು ಶಕ್ತಿಯುಳ್ಳವರಿ ನಿರೂಪಿಸಿದ
ಸಿದ್ಧಾಂತಗಳು ಪ್ರಕೃತಿಯನ್ನು ತಪ್ಪಾಗಿ
ಅರ್ಥೈಸಿಕೊಳ್ಳುತ್ತಿರುವ ಕುರುಹುಗಳು

ಅನಿಲಗಳ ನಿರ್ದಿಷ್ಟ ಉಷ್ಣ
ಭೌತ ಬಾಹಿ ವಿಶ್ವರೂಪ

ಬೆಳಕಿನ
ವರ್ತನೆಯು
ವಿಜ್ಞಾನಿಗಳಿಗೆ
ತಲೆನೋವಾಗಿ
ಪರಿಣಮಿಸುತ್ತಿತ್ತು.

ನೋಡು ನಾನು ಇವುಗಳನ್ನು
ನಿಂತುಕೊಂಡೇ V ವೇಗದಲ್ಲಿ
ಎಸೆಯಬಹುದು.

ಎ. ಮೈಕಲ್ಸ್‌ಸನ್
(1852-1921)

ಇ. ಮೊರ್ಟಿ (1838-1923)

ನಾನು u ವೇಗದಲ್ಲಿ ಓಡುತ್ತಾ ಎಸೆದರೆ ಅವು
(v+u) ಮತ್ತು (v-u) ವೇಗದಲ್ಲಿ ಚಲಿಸುತ್ತದೆ.

ವಿ !
ಗಮನವಿರಲಿ !

CRASH!

ಅಯ್ಯೋ !
ನಾನು ಹೇಳಿದ್ದು
ತಿಳಿವಳಿಕೆಯೇ
...ಅ!

ವಿ !
ಜೋಪಾನ

"ಬೆಳಕು ಕೇಂದ್ರದಲ್ಲಿ ಕಂಪನಗಾಗಿ
ಚಲಿಸುತ್ತದೆ ಎಂದು ಭಾವಿಸಲಾಗಿತ್ತು...

SUN
AETHER
EARTH

ಭೂಮಿಯೂ ಕೇಂದ್ರದಲ್ಲಿ ಚಲಿಸುತ್ತದೆ. ಇದರಿಂದ
ಪ್ರತಿಯೊಂದು ದಿಕ್ಕಿನಲ್ಲೂ ಬೆಳಕಿನ ವೇಗ ಬೇರೆಯಿರಬೇಕು.

c-v
c+v
ಭೂಮಿಯ ವೇಗ v

ಇದನ್ನು ಪರಿಶೀಲಿಸಲು
ಒಂದು ಸೂಕ್ಷ್ಮ ಪ್ರಯೋಗ ...

... ಆದರೆ ಎಲ್ಲಾ ದಿಕ್ಕುಗಳಲ್ಲೂ
ಬೆಳಕಿನ ವೇಗ ಒಂದೇ ಇತ್ತು.

ಬೆಳಕಿನ ವೇಗಕ್ಕೂ ಅದರ
ಮೂಲದ ವೇಗಕ್ಕೂ
ಸಂಬಂಧವಿಲ್ಲವೇನು ?

ಆದರೆ ...
ಅದು ಹೇಗೆ
ಸಾಧ್ಯ ?

ಪ್ರಾಧ್ಯಾಪಕರೇ,
ಭೌತಶಾಸ್ತ್ರ
ಹೇಗಿದೆ ?

ಟೆನ್ನಿಸ್ ! ಈ ನಿರ್ದಿಷ್ಟ ಉಷ್ಣ
ಮತ್ತು ಕೇಂದ್ರ
ಪ್ರಯೋಗಗಳನ್ನು ಹೊರತುಪಡಿಸಿ

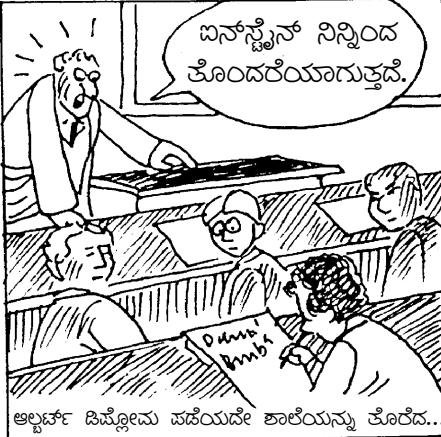
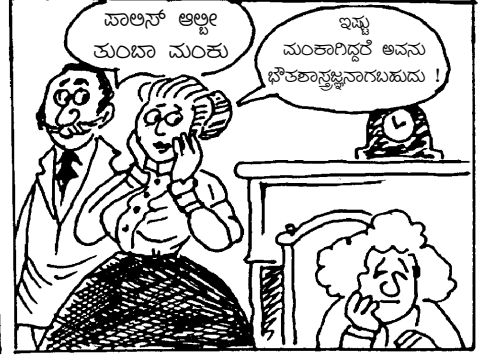
19ನೇ ಶತಮಾನದ ಕೊನೆಯಲ್ಲಿ
ಭೌತಶಾಸ್ತ್ರ ಇದ್ದದ್ದು ಹಾಗೆ.

ಕ್ಲಾಸಿಕಲ್ ಭೌತಶಾస్త్రದ
ಈ ಸಮಸ್ಯೆಗಳಿಂದಾಗಿ
ಮೂಲತತ್ವಗಳನ್ನೇ
ಬಹಳವಾಗಿ
ಬದಲಾಯಿಸಬೇಕಾಯಿತು.
ಈ ಬದಲಾವಣೆಯಾದದ್ದು
ರಿಲೇಟಿವಿಟಿ ಮತ್ತು ಕ್ವಾంటಂ
ಸಿದ್ಧಾಂತಗಳಿಂದ

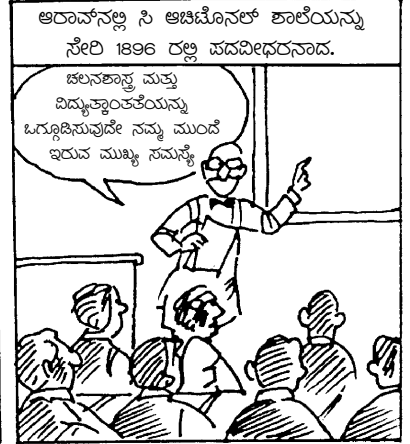
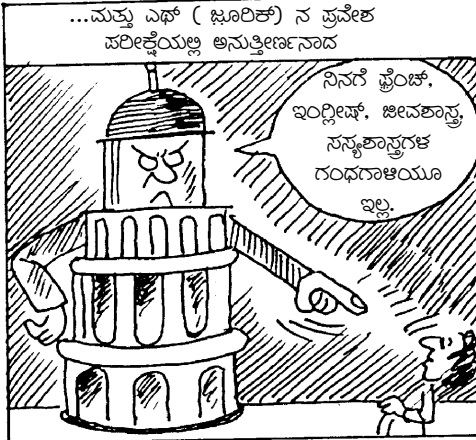
ಆಲ್ಬರ್ಟ್ ಐನ್‌ಸ್ಟೈನ್, 1879 ರಲ್ಲಿ ಹುಟ್ಟಿದ ಬಾಲಕ



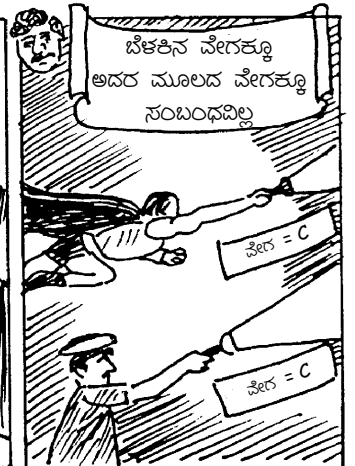
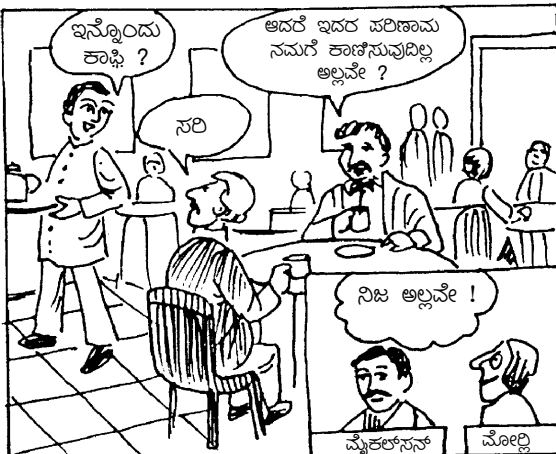
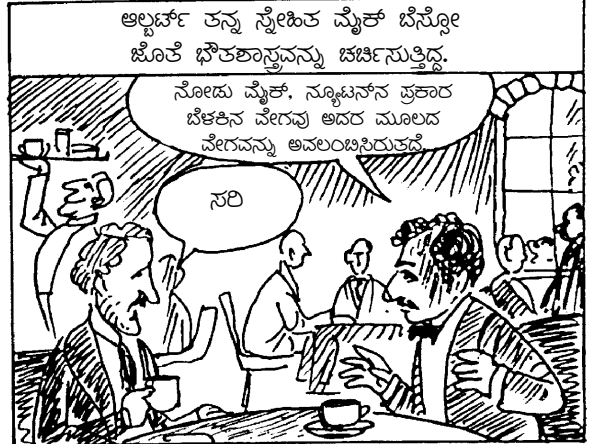
ಆಲ್ಬರ್ಟ್‌ನ ಬಾಲ್ಯ ಎಂಥ ಪೆದ್ದನಿಗೂ
ಭರವಸ್ ಕೊಡುತ್ತದೆ.



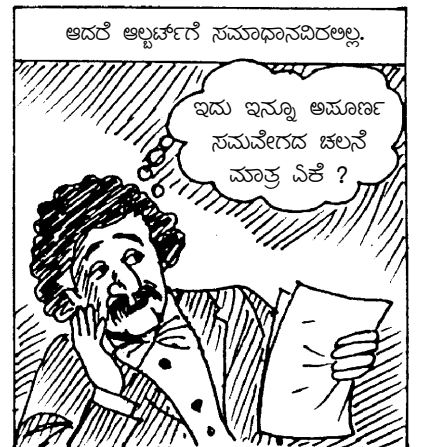
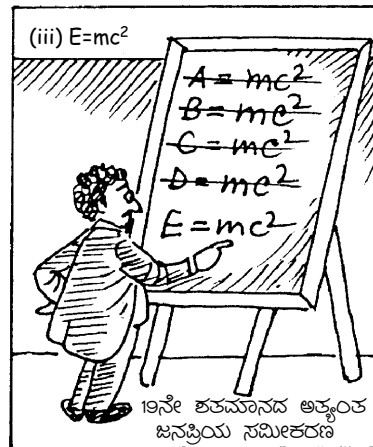
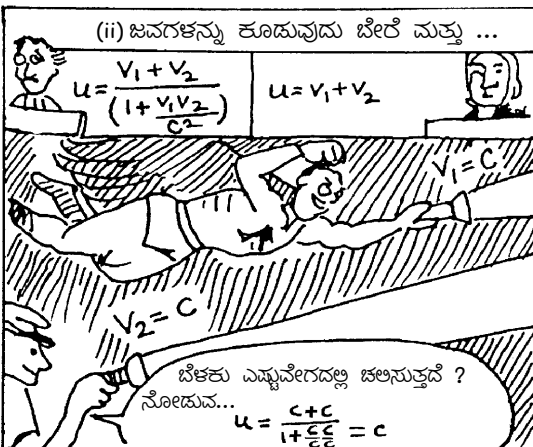
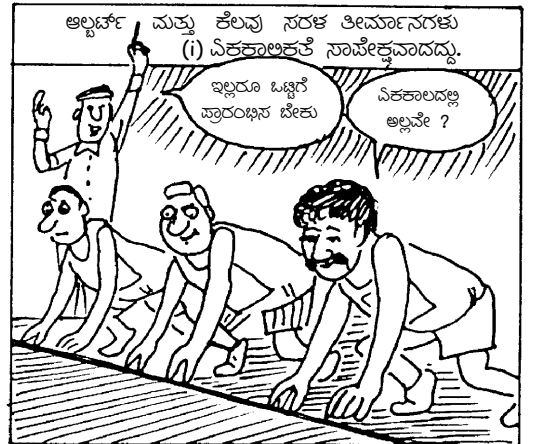
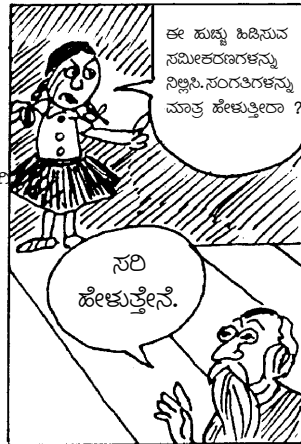
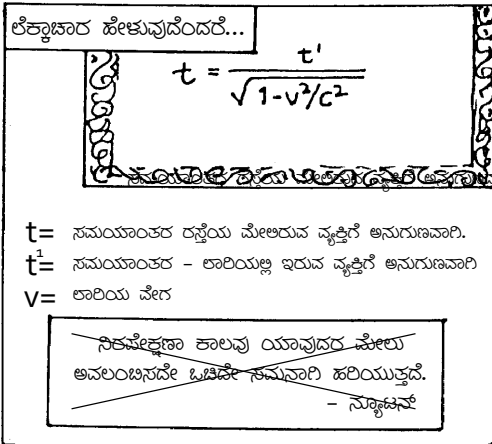
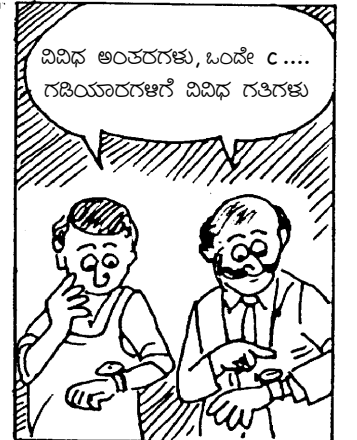
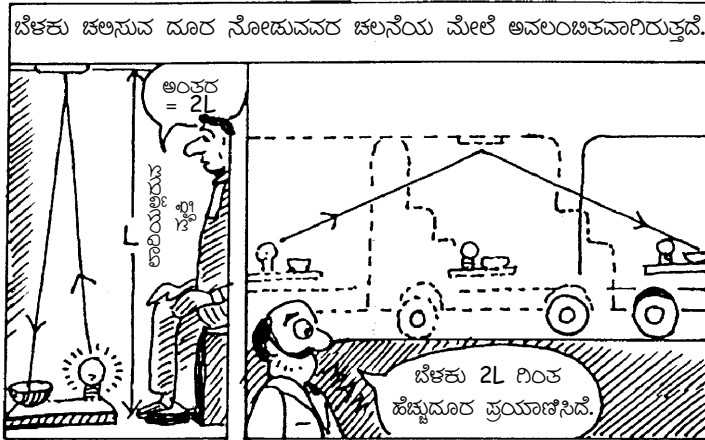
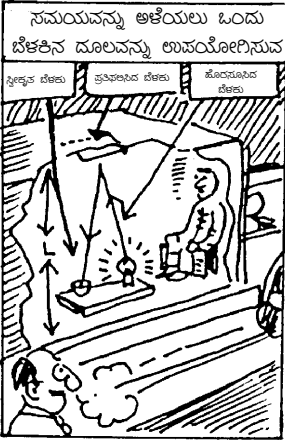
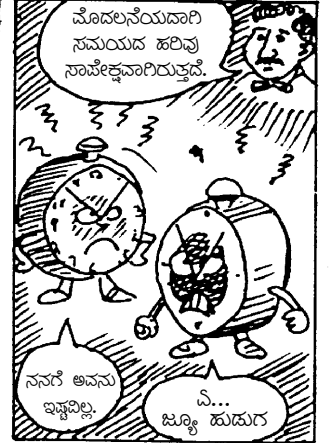
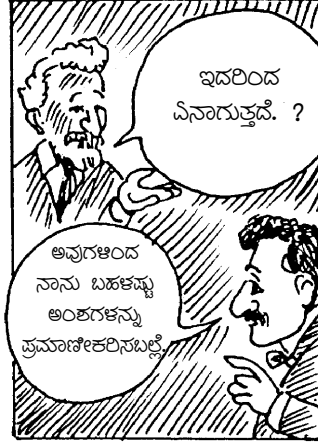
ಆಲ್ಬರ್ಟ್ ಡಿವೈಲೋಮ್ ಪಡೆಯದೇ ಶಾಲೆಯನ್ನು ಕೊರೆದ...



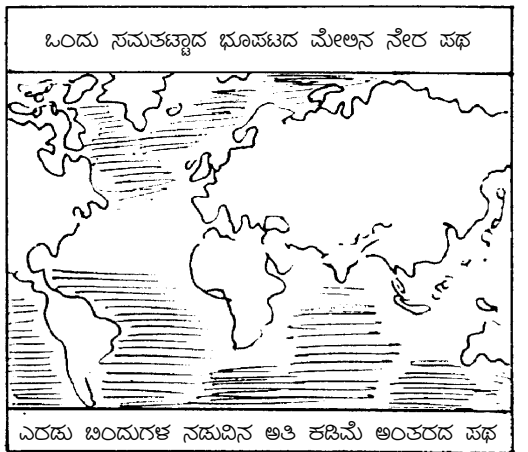
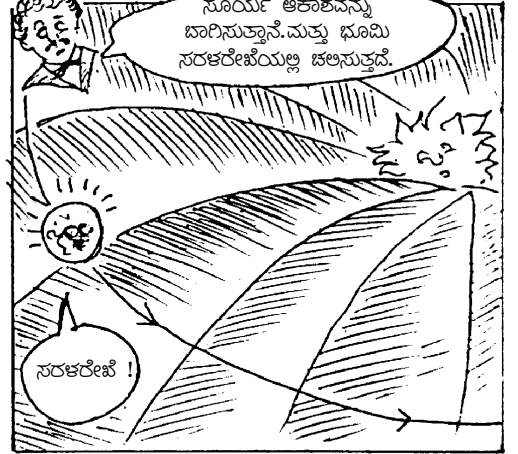
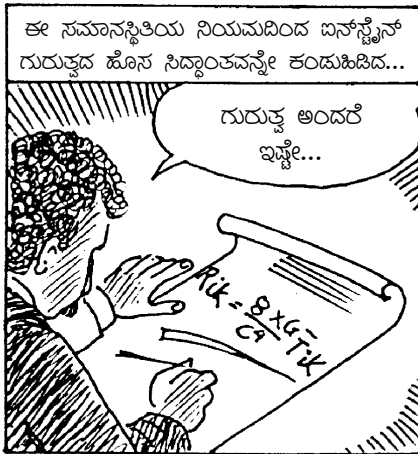
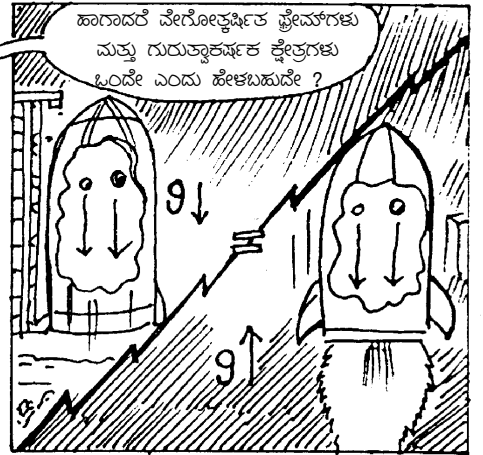
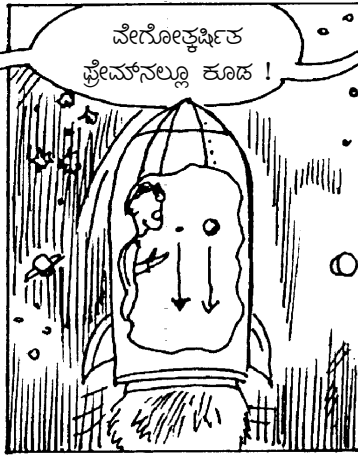
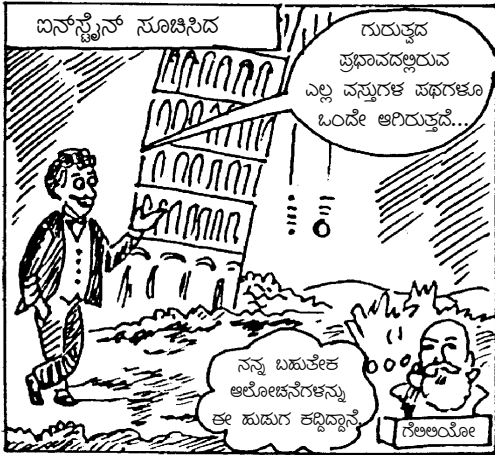
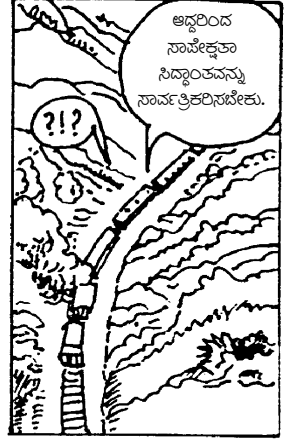
ಜೂರಿಕ್‌ನಲ್ಲಿ
ಐದು ವರ್ಷ
ಕಳೆದ ಮೇಲೆ,
ಅವನ ಸ್ನೇಹಿತ
ಮಾರ್ಸೆಲ್
ಗ್ರಾನ್‌ಮನ್‌ನ
ಪ್ರಭಾವದಿಂದ
ಬರ್ನ್‌ನಲ್ಲಿ
ಕೆಲಸ ಸಿಕ್ಕಿತು.



భౌతికశాస్త్రం
నియమగతులు
నిశ్చలస్థితి మరియు
సమవేగం
జలనేగక నడుచు
వ్యత్యాస
మాడబారదు
ఎంబుడు
ఆల్బెర్ట్‌ ఐన్‌స్‌టైన్‌
నంటికియోగిస్తు.



ಎಲ್ಲಾ ರೀತಿಯ
ಜಲನೆಗಳನ್ನೂ
ಒಳಗೊಳ್ಳುವಂತೆ
ಈ ಸಿದ್ಧಾಂತವನ್ನು
ವಿವರಿಸಿದ.
ಇದು ಅತ್ಯಂತ
ಸುಂದರ ಸಿದ್ಧಾಂತ

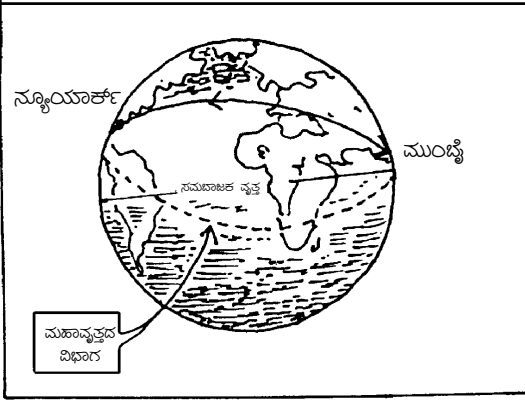


ಐನ್‌ಸ್ಟೈನ್ ಪ್ರಕಾರ ಜೊತೆ ಸರಳ ರೇಖೆಯಲ್ಲಿ ಹೋಗುತ್ತಿದೆ.

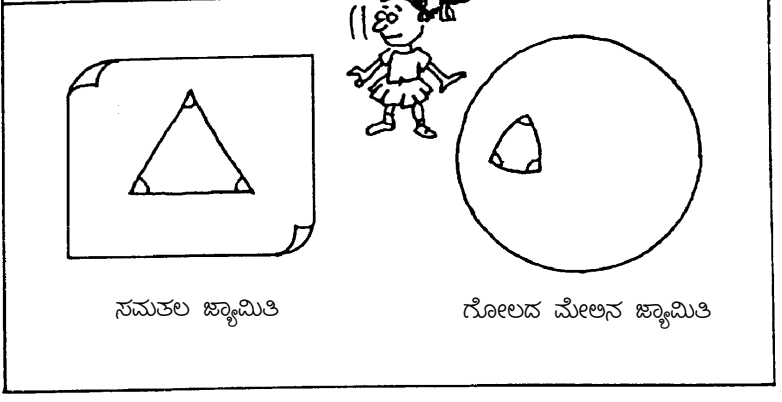
ನೇರವಾಗಿ ಹೋಗುವುದು ಸೂಕ್ಷ್ಮವಿಚಾರ ಕೂಡ ಆಗಬಹುದು

ಎರಡು ಬಿಂದುಗಳ ನಡುವಿನ ಅತಿ ಕಡಿಮೆ ಅಂತರದ ಪಥ

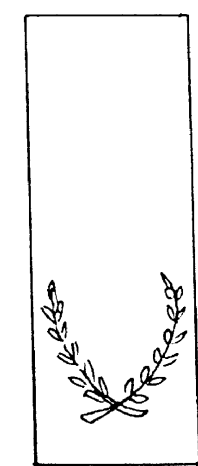
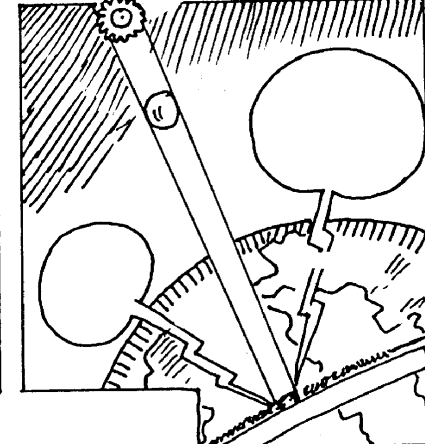
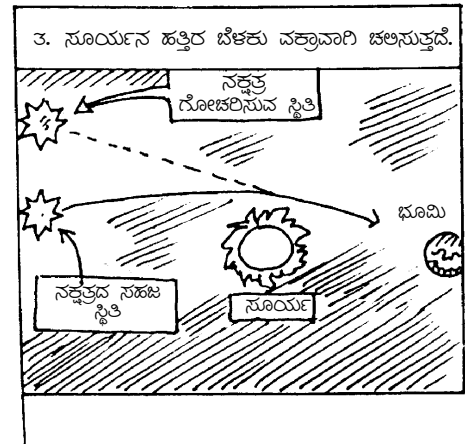
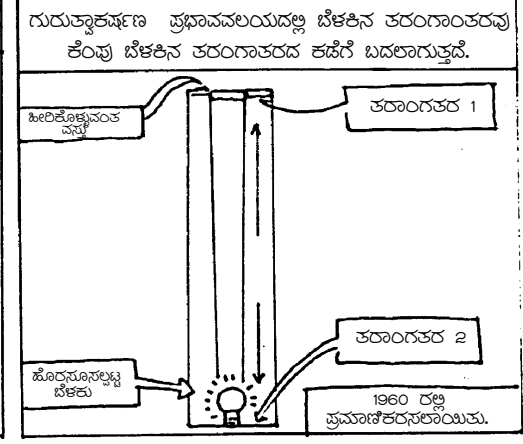
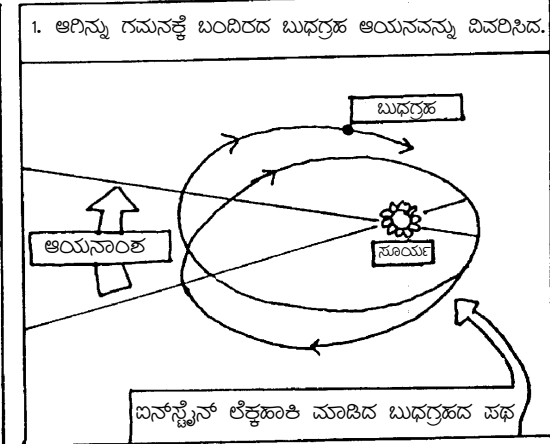
ಗೋಳದ ಮೇಲಿನ ನೇರ ಪಥಕ್ಕಿಂತ ಉದ್ದವಾಗಿರಬಹುದು !



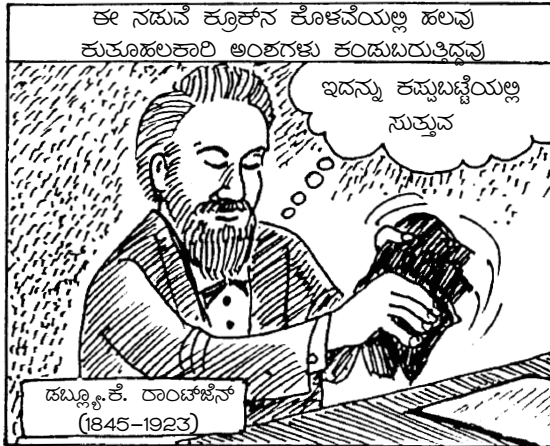
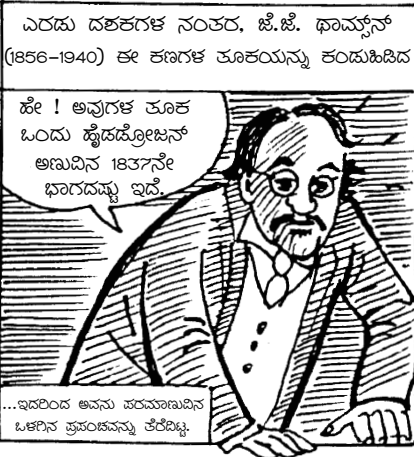
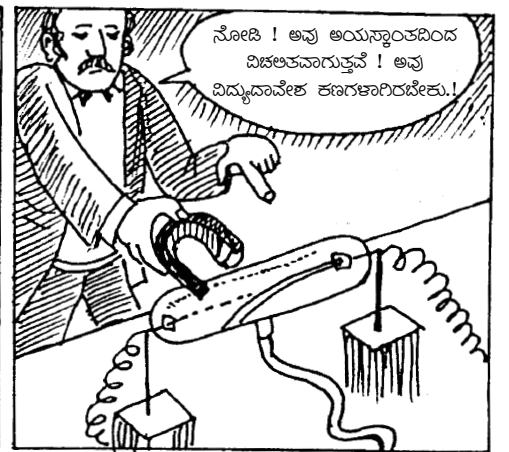
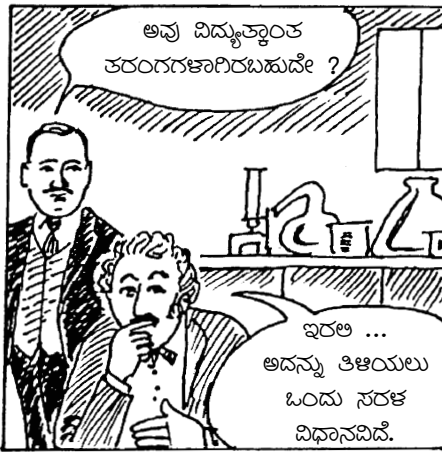
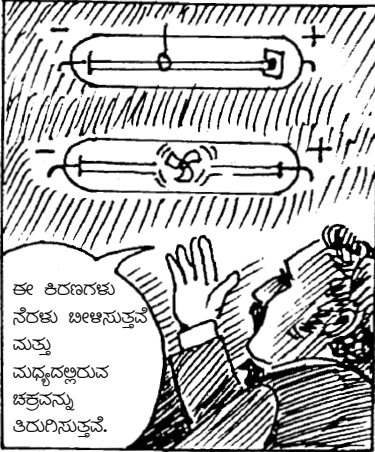
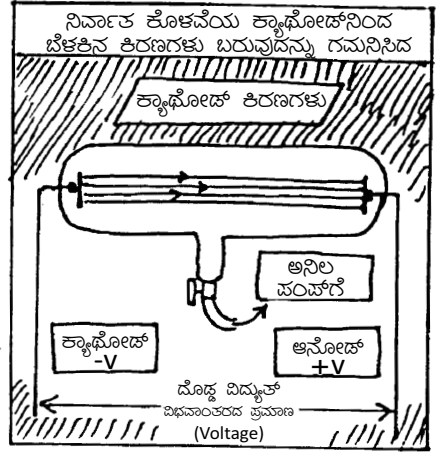
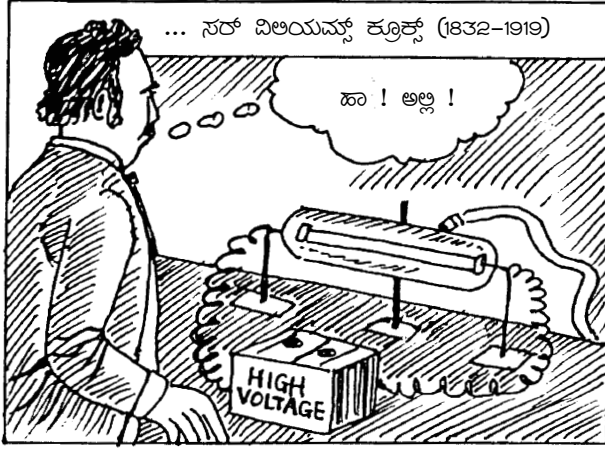
ವಕ್ರ ಅಕಾಶದ ಜ್ಯಾಮಿತಿಗೂ ಸಮಕೋನ ಜ್ಯಾಮಿತಿಗೂ ಬಹಳ ವ್ಯತ್ಯಾಸವಿದೆ.



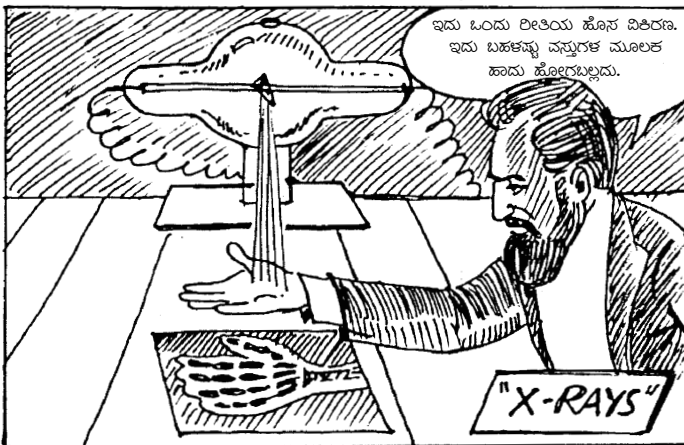
ವಕ್ರವಾದ
ಕಾಲ-ದೇಶಕ್ಕೆ
ಸರಿಯಾದ
ಜ್ಯಾಮಿತಿಯನ್ನು
ಉಪಯೋಗಿಸಿಕೊಂಡು
ರಸ್ತೆ ಗುರುತಿಸಿ
ಸಿದ್ಧಾಂತದ
ಪರಿಣಾಮಗಳನ್ನು
ಐನ್‌ಸ್ಟೈನ್‌ನು
ಲೆಕ್ಕ ಹಾಕಿದ.



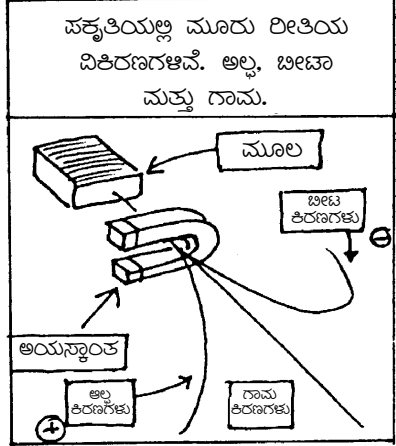
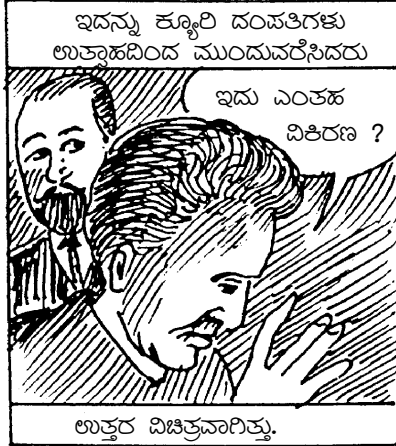
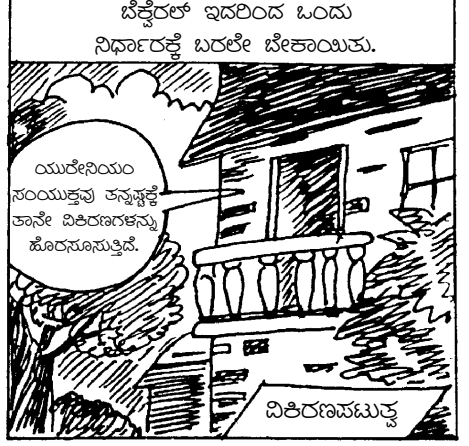
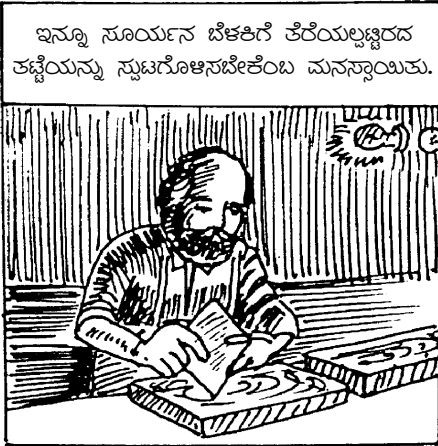
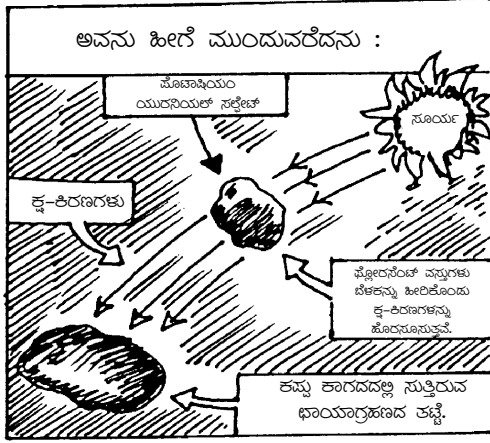
సాపేక్షణా
క్రాంతియు
నడೆಯుత్తిరువార,
కలవు భౌత విజ్ఞానిగకు
వస్తువిన రజనీయన్ను
అథఃమాదిశోక్తులు
ప్రయత్నిస్తున్నారు.
మోదలగి....



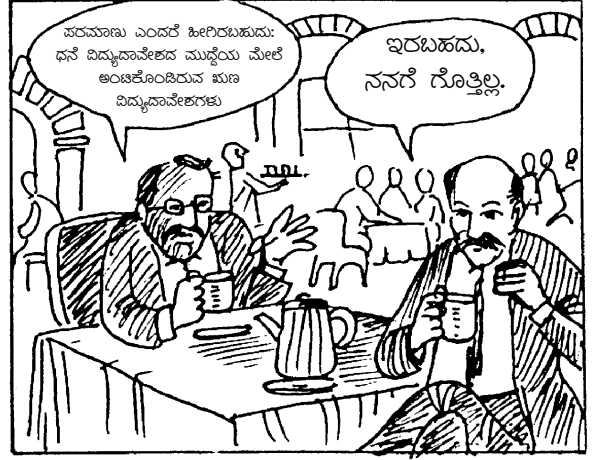
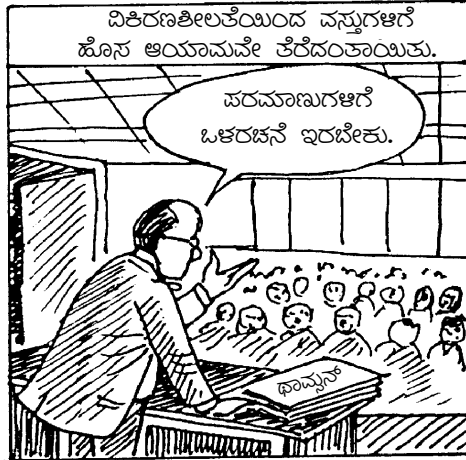
సూక్ష్మ ప్రయోగగళిండ రాంటజీన్ ఈ ప్రజ్ఞేగే లుత్తర కండుచేండ

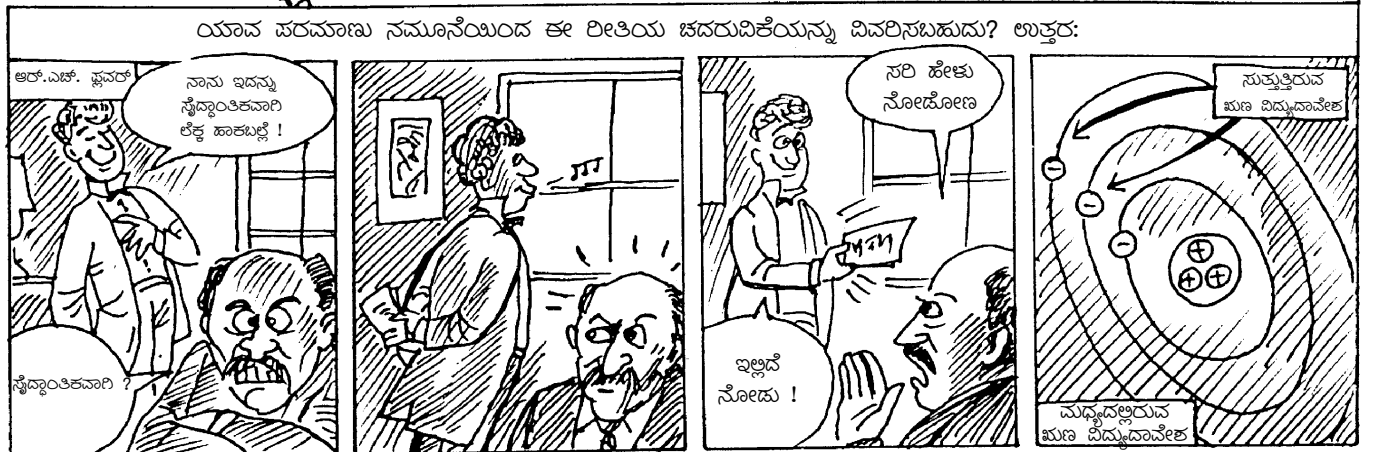
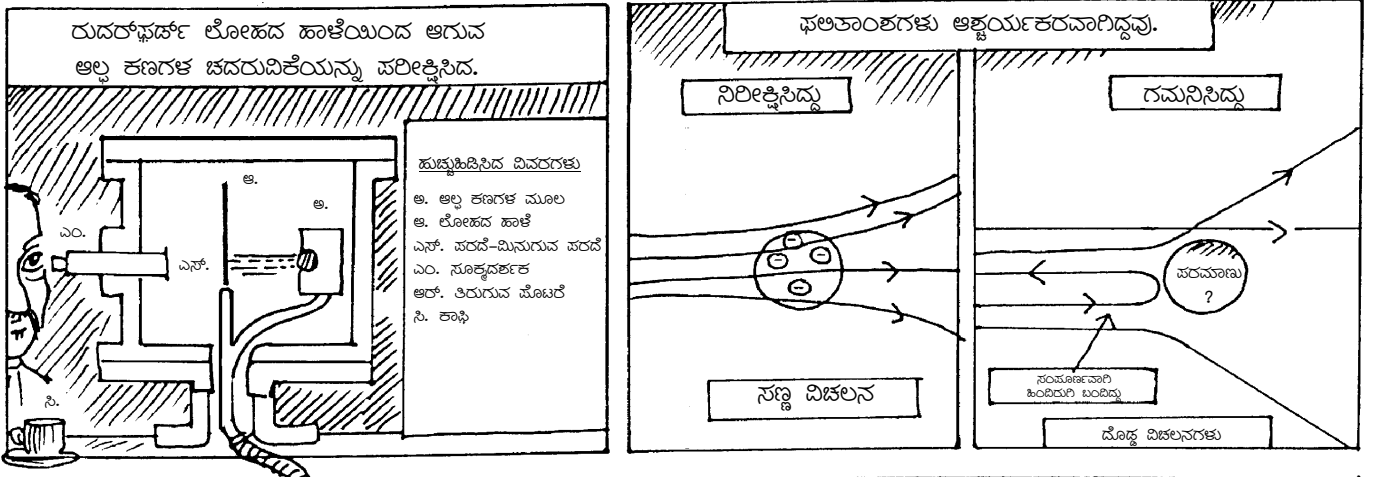
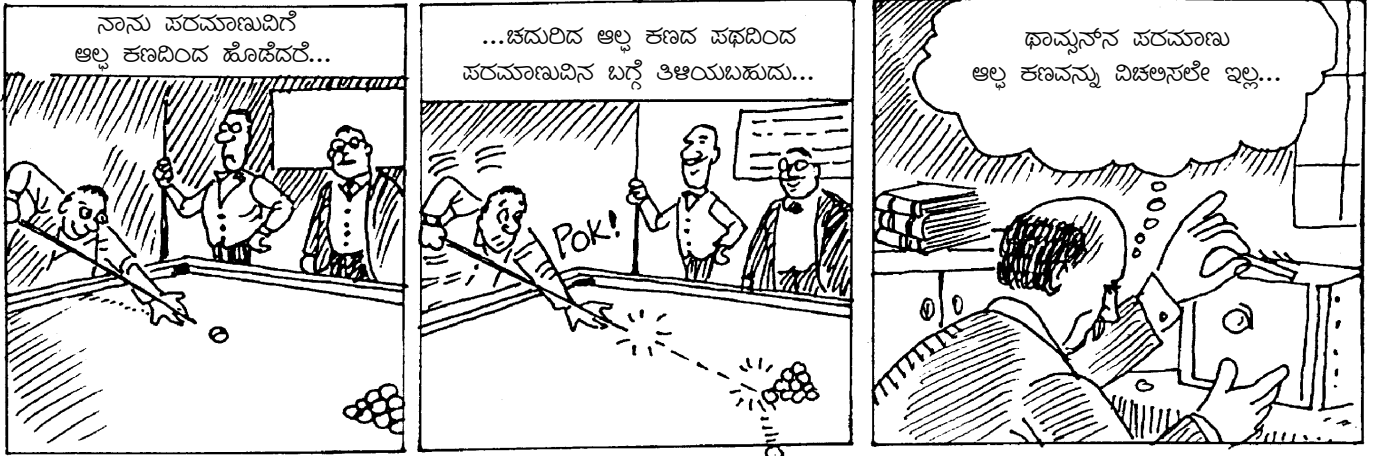
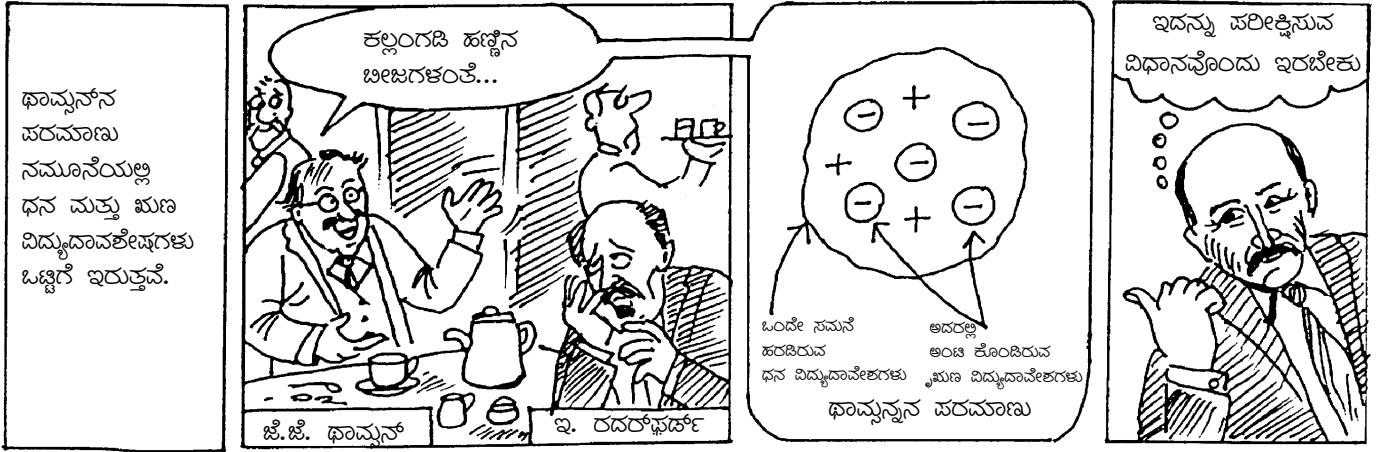


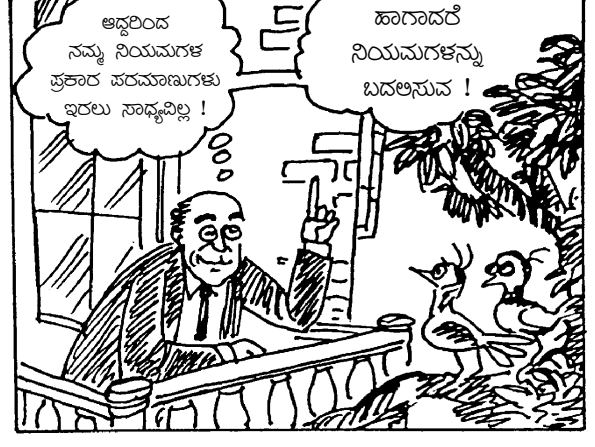
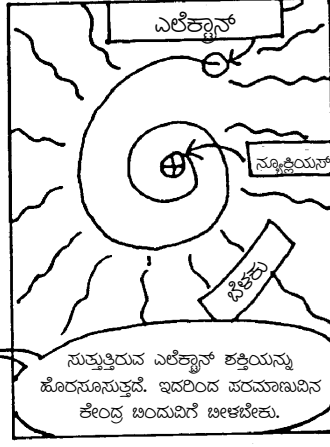
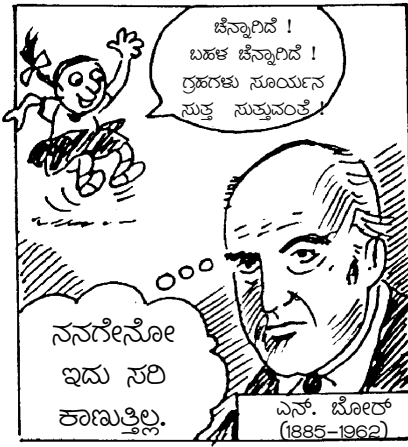
ಕ್ವ-ಶಿರಣಗಳನ್ನು
ಮೊದಲು ಕ್ರಮಬದ್ಧವಾಗಿ
ಪರೀಕ್ಷಿಸಿದವನು
ಫ್ರೆಂಚ್ ವಿಜ್ಞಾನಿ
ಎ.ಹೆಚ್. ಬೆಕ್ವೆರೆಲ್
(1852-1908).
ಇವನು ಫ್ಲೋರನೇಂಟ್
ವಸ್ತುಗಳ ಹೊರ
ಸೂಸಿದ ಕ್ವ-ಶಿರಣಗಳನ್ನು
ಸಂಶೋಧಿಸುತ್ತಿದ್ದನು.



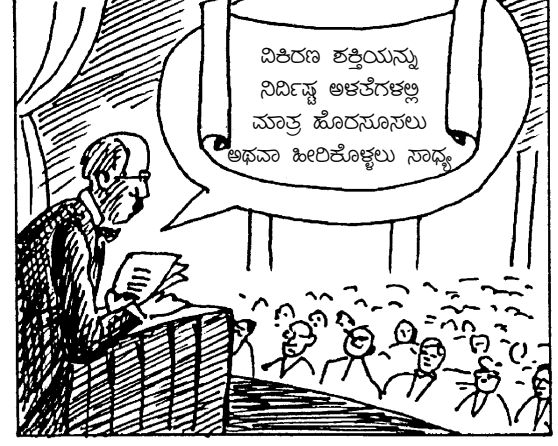
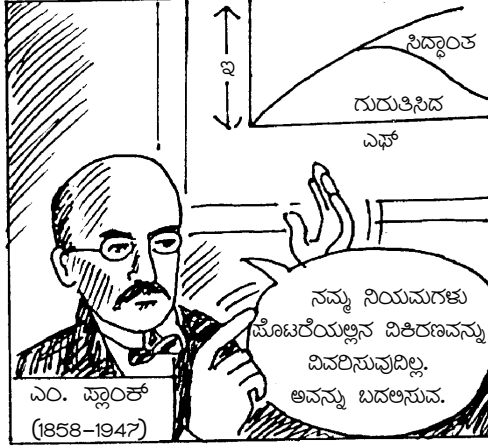
ಬಹಳ ವರ್ಷಗಳ
ನಂತರ ಪರಿಶ್ರಮದಿಂದಾಗಿ
ಅವರು ಒಂದು ವಿಶಿರಣದ
ಶಕ್ತಿಕಾಲ ಮೂಲವೊಂದನ್ನು
ಪ್ರತ್ಯೇಕಿಸಿದರು.
ಅದೇ "ರೇಡಿಯಂ"







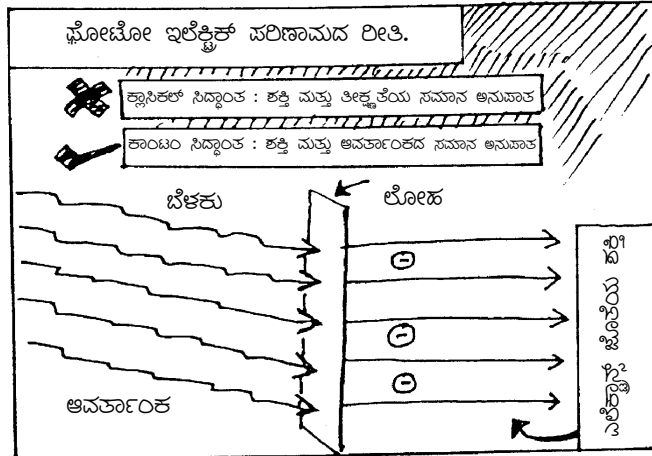
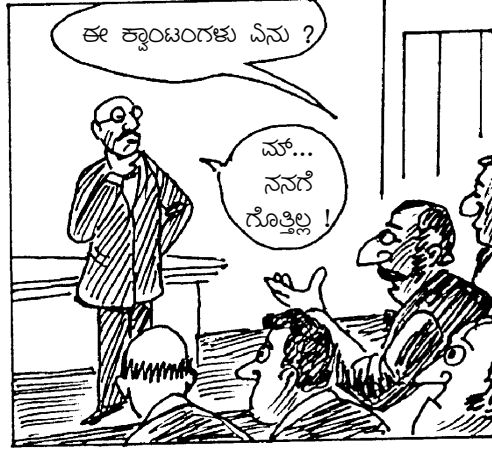
ಬೋರ್‌ನು ನಿಯಮಗಳನ್ನು ಹೇಗೆ ಬದಲಿಸಿದ ಎಂದು ತಿಳಿಯಲು ಕೆಲವು ವರ್ಷ ಹಿಂದಕ್ಕೆ ಹೋಗಬೇಕು. ಆಗಲೇ ವಿಜ್ಞಾನಿಯೊಬ್ಬ ನಿಯಮಗಳನ್ನು ಬದಲಿಸುವ ಪ್ರಯತ್ನದಲ್ಲಿದ್ದ !



ಪ್ಲಾಂಕ್‌ನು ಒಂದು ಹೊಸ ನಿಯತಾಂಕವನ್ನು ಸೂಚಿಸಿದನು.

ಒಂದು ಕ್ವಾಂಟಂ ಶಕ್ತಿ $h \times$ ಆವರ್ತಾಂಕ

$h = 6.6 \times 10^{-27}$ ergs.sec

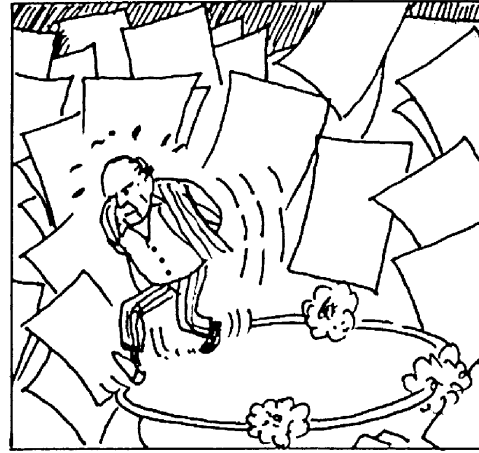


అవన
యోజనాయంతే
ముందువరేయలు
నిల్వోమోర
శలవు నియమగళన్న
చేబిడబీకాయు.

ఇలెక్ట్రాన్‌గళు న్యూక్లియస్‌నిండ
ఎల్లి అంతరగళల్లి సుతలు సాధ్యవిల్లి.

వేగోత్తరగళగోండిగళరూ, అవు ఒందు నిదిగళ
పథదల్లిదగళ శక్తియన్ను శోరసూసలు సాధ్యవిల్లి.

ఇలెక్ట్రాన్‌గళు ఒందు పథదిండ మక్కిందు
పథకే శరిదాగ మార్త శక్తియన్ను
శోర సూసుత్వే.



యురేకా !
శోనియ
అవేగవు
శ్చాంజిరెరినల్లిణ్ణి.

ఇదు ఎంథ అవేగ

m - రాశి
 v - వేగ
 r - త్రిజ్య

ఈగ బోర అనుమోదిత
పథగళన్ను గురుతిసబకుదిచ్చ...

mvr
 $n(n/2\pi)$

$n=1,2,3,4,$

... మత్తు అవుగళ శక్తియన్ను లెక్తశాకబకుదిచ్చ.

$E_n + 13.6\text{ev}/n^2$

$n=1.E_1$ $n=2.E_2$

శక్తి మత్తు
అవతాంకగళు $E=hf$ నిండ
శోరినల్లిణ్ణిరువుదరిండ...

బిన్‌స్టోన్
ఒప్పత్తేనే !

ఖండితా !

వ్లాంక్

... ఒందు పథదిండ శారువ ఇలెక్ట్రాన్
ఒందు నిదిగళ అవతాంకదల్లి శక్తియన్ను
శోరసూసుత్వే. ఇదన్న
నాను లెక్తశాకబల్లి !

శోదే!

శోదు !
శలవు ప్రయోగగళు
ఇదన్న ప్రమాణోకరిసివే

ಹಲವು
ಸಂಕೀರ್ಣತೆಗಳಿಂದ
ಪರಮಾಣುವನ್ನು
ಮತ್ತೂ ಚೆನ್ನಾಗಿ
ಅರ್ಥಮಾಡಿಕೊಳ್ಳಲು
ಸಾಧ್ಯವಾಯಿತಷ್ಟೆ.
ಮೊದಲನೆಯದಾಗಿ,
ನೋಮರ್‌ಫೀಲ್ಡ್
ಪಥಗಳನ್ನು
ಪರಿಚಯಿಸಿದ.



ನೋಮರ್‌ಫೀಲ್ಡ್
(1868-1951)

ನೋಮರ್‌ಫೀಲ್ಡ್

ಹೌದು !
ನಾನು ಆಗಲೇ
ಹೇಳಿದ್ದೆಲ್ಲ



ಕೆಪ್ಲರ್

$n=1$ ಅಂದರೆ
ಒಂದು ವೃತ್ತೀಯ ಪಥ
 $n=2$ ಅಂದರೆ
ಒಂದು ವೃತ್ತ ಮತ್ತು ಮೂರು
ಭೀರ್ವೃತ್ತಗಳು.



ನಂತರ ಬಂತು ಪೌಲಿಯ
ಬಹಿಷ್ಕರಣ ನಿಯಮ



ಒಂದೇ ಪಥದಲ್ಲಿ
ಎರಡಕ್ಕಿಂತ ಹೆಚ್ಚು
ಇಲೆಕ್ಟ್ರಾನ್‌ಗಳು
ಇರಲು ಸಾಧ್ಯವಿಲ್ಲ

ಎಕೆ ?

ಡಬ್ಲ್ಯೂ. ಪೌಲಿ
(1900-1958)

ಎಕೆಂದರೆ
ಮೊಂಟಿಯಾಗುತ್ತದೆ !
ಅಲ್ಲದೇ ...



ಈ ನಿಯಮದಿಂದ
ನಾನು
ಅವರ್ತಕೋಷ್ಟಕವನ್ನು
ವಿವರಿಸಬಲ್ಲೆ !

ಮೂಲವಸ್ತುಗಳ ಅವರ್ತಕೋಷ್ಟಕ

H	He																	He
Li	Be																	Ne
Na	Mg																	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	
Cs	Ba		Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	
Fr	Ra		Rf															
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu					
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr					

ಪೌಲಿಯ ನಿಜವಾಗಿಯೂ
ವಿವರಿಸಬಲ್ಲವನಾಗಿದ್ದ !

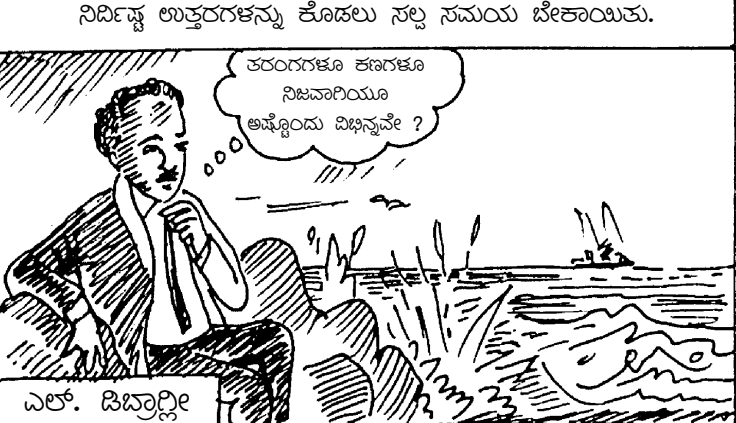
ಅದರ ಇವೆಲ್ಲಕ್ಕೂ
ತಾತ್ಕಾಲಿಕ !



ಈ
ಪಥಗಳಾದರೂ
ಯಾವುವು ?

ಹೌದು ಅದರ ಅವುಗಳು
ಸರಿ ಕಾಣುತ್ತವೆಯಲ್ಲಾ ?

ನಿರ್ದಿಷ್ಟ ಉತ್ತರಗಳನ್ನು ಕೊಡಲು ಸಲ್ಲ ಸಮಯ ಬೇಕಾಯಿತು.



ತರಂಗಗಳೂ ಕಣಗಳೂ
ನಿಜವಾಗಿಯೂ
ಅಷ್ಟೇ ಎಂದು ವಿಚಿನ್ತವೇ ?

ಎಲ್. ಡಿಬ್ರಾಗ್ಲೀ

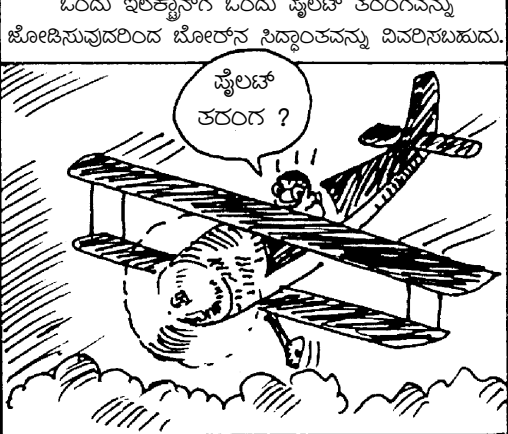
ವಿದುಷ್ಕಾರ ತರಂಗಕ್ಕೆ
ಕಣದ ಗುಣಗಳಿವೆ



ಹಾಗಾದರೆ ಕಣಗಳಿಗೆ
ತರಂಗದ
ಗುಣಗಳಿರಬಾರದು ?

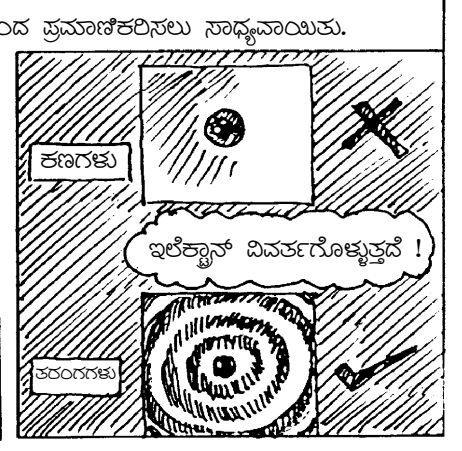
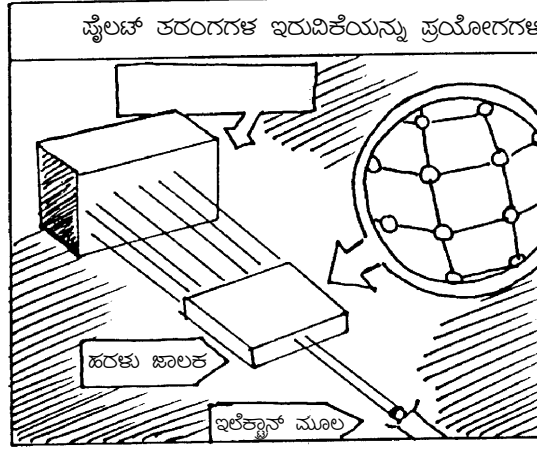
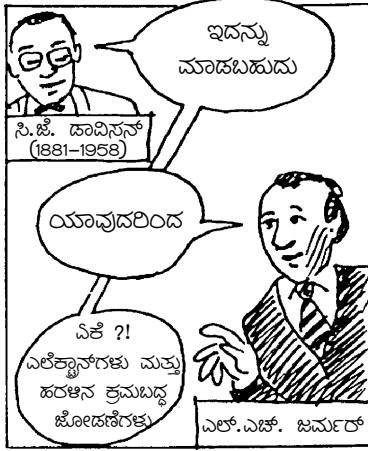
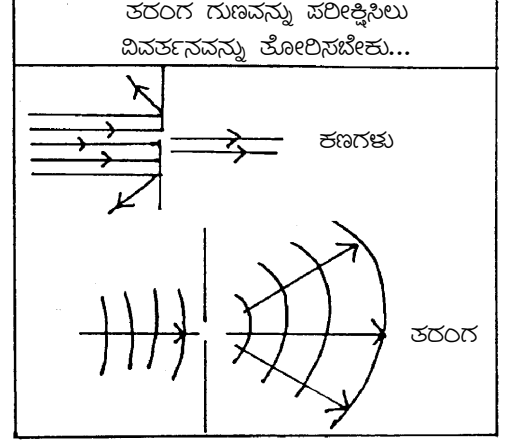
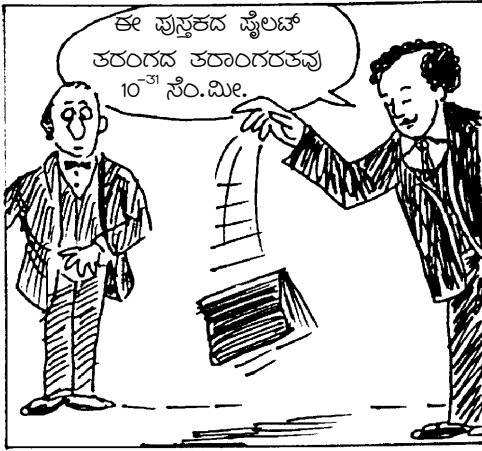
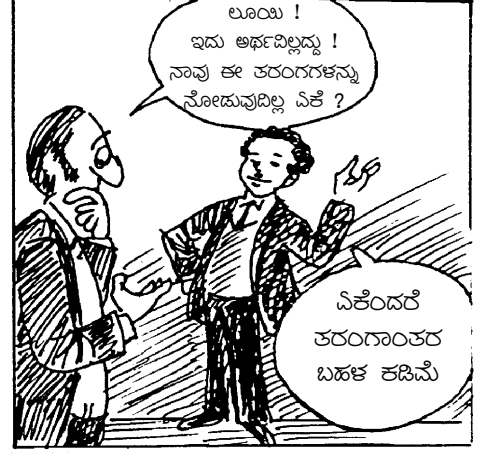
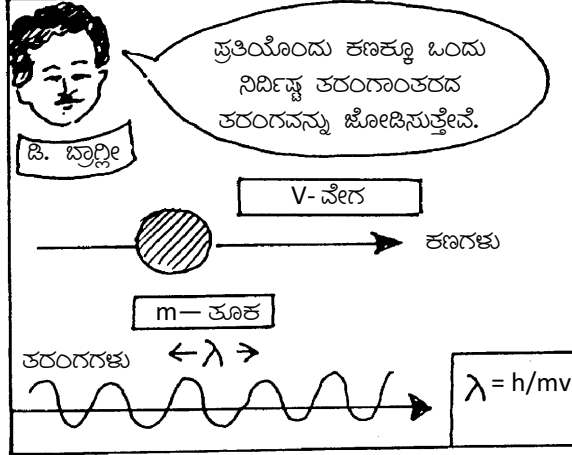


ಒಂದು ಇಲೆಕ್ಟ್ರಾನ್‌ಗೆ ಒಂದು ಫೈಲಿಟ್ ತರಂಗವನ್ನು
ಜೋಡಿಸುವುದರಿಂದ ಬೋರ್‌ನ ಸಿದ್ಧಾಂತವನ್ನು ವಿವರಿಸಬಹುದು.

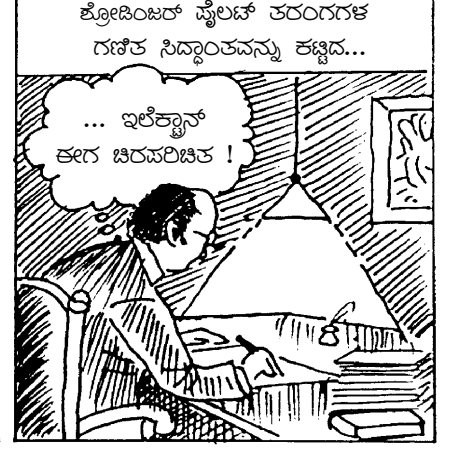
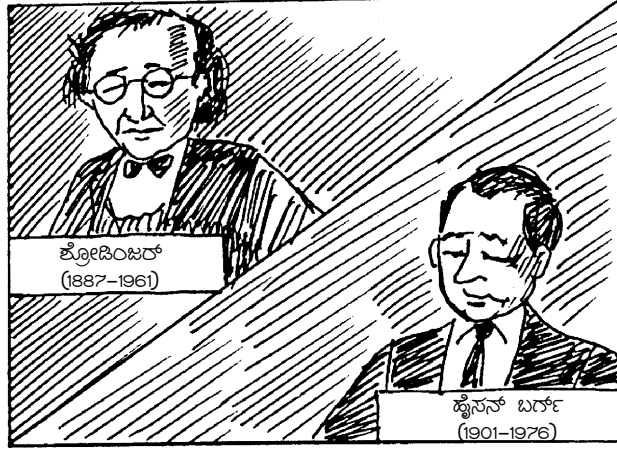


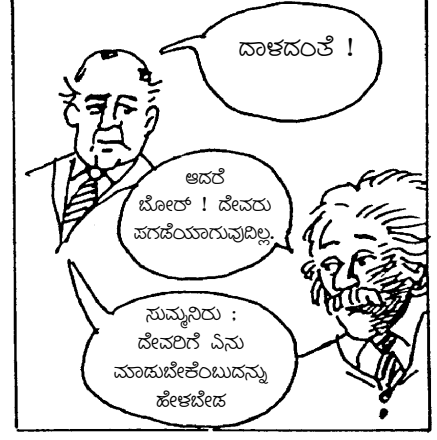
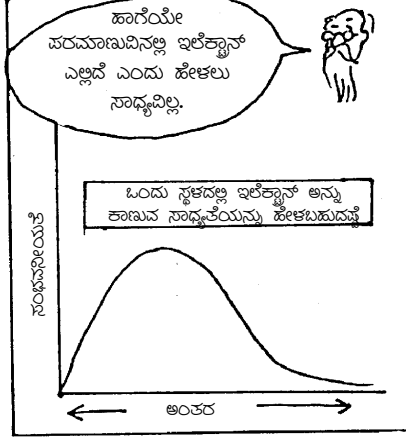
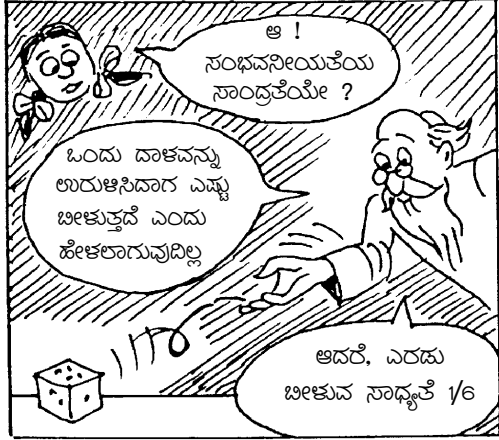
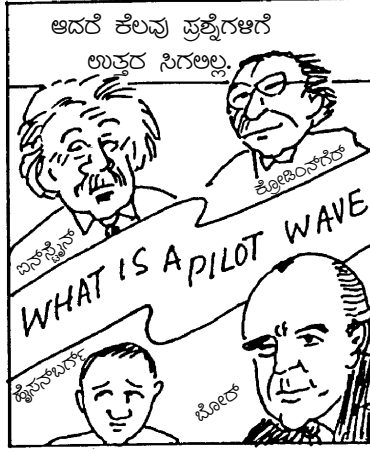
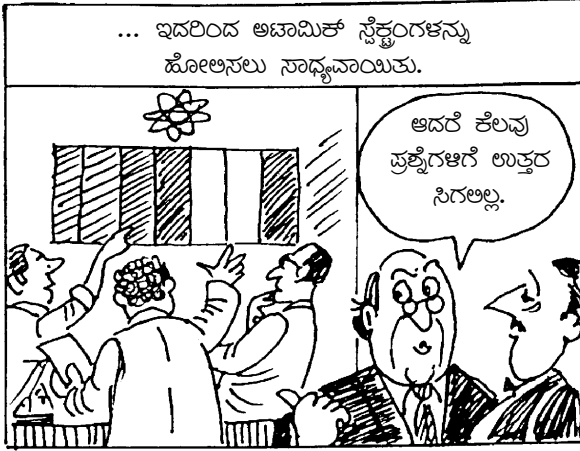
ಫೈಲಿಟ್
ತರಂಗ ?

ఓండు దిట్ట
అలీజనేయింద
బోరో ఈ ఠాగూ
తరంగకన్న
ఓండుగూడిసిద.

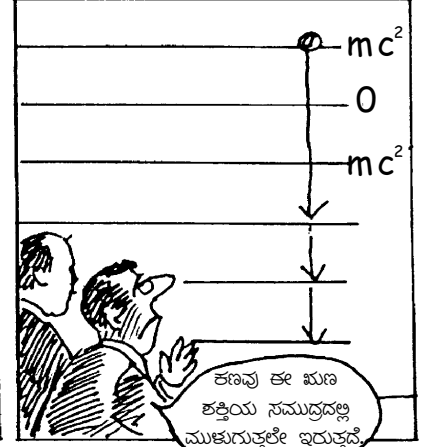
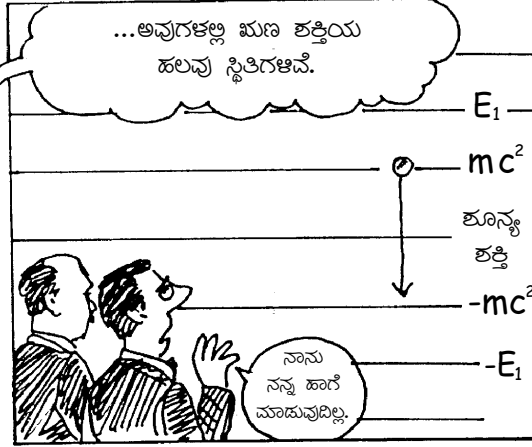
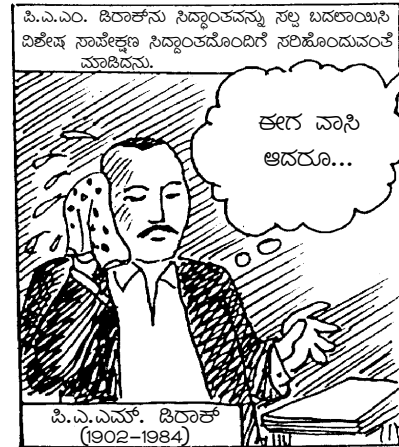
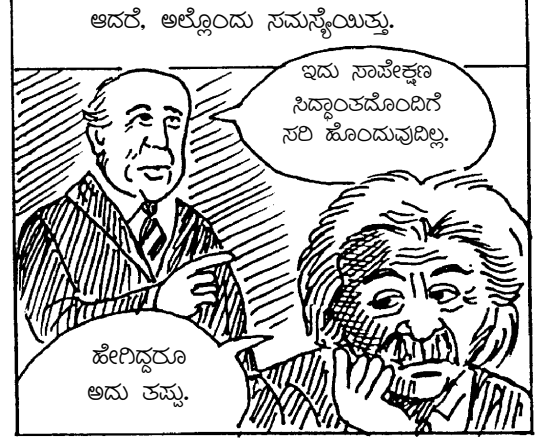
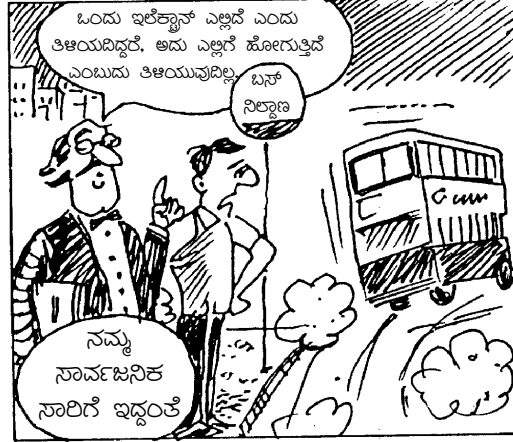


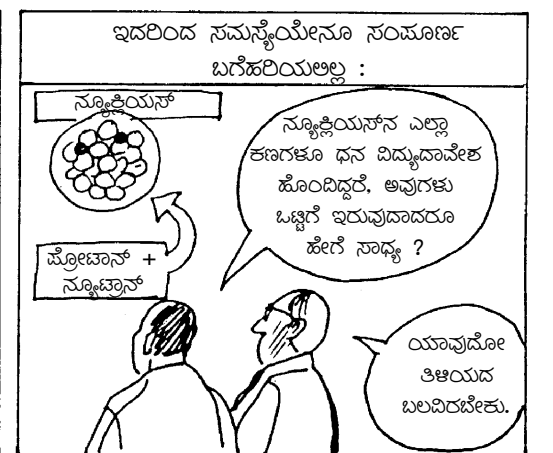
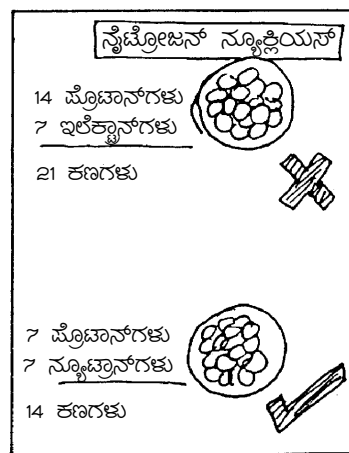
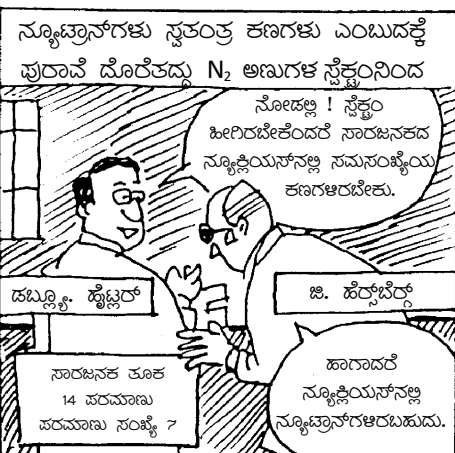
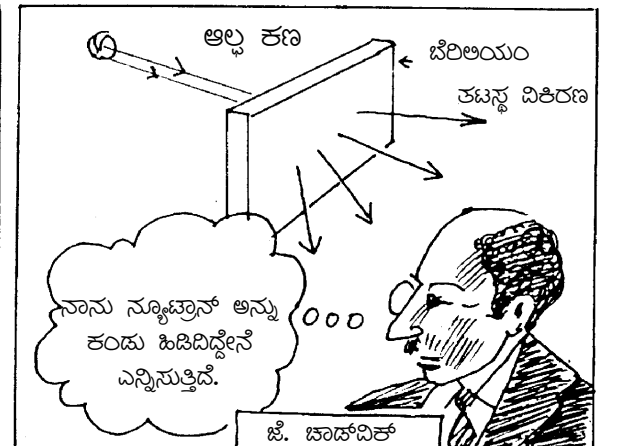
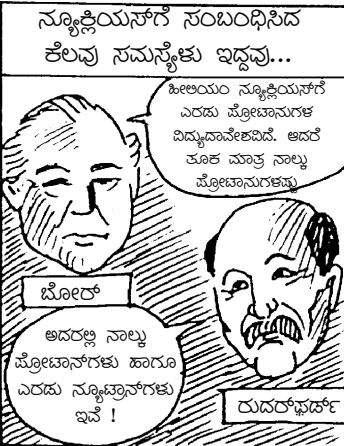
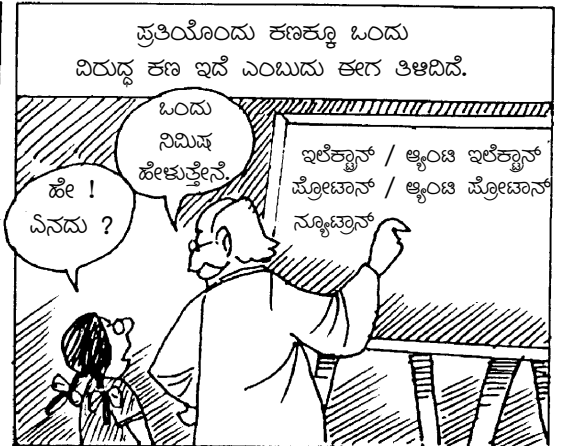
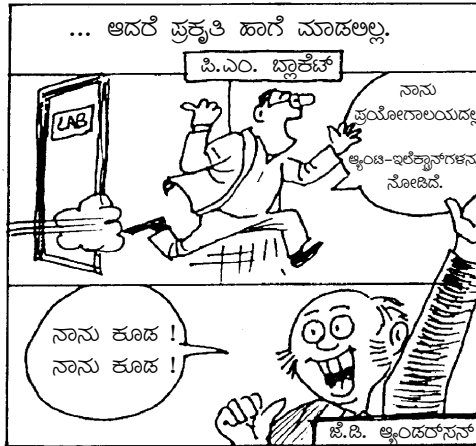
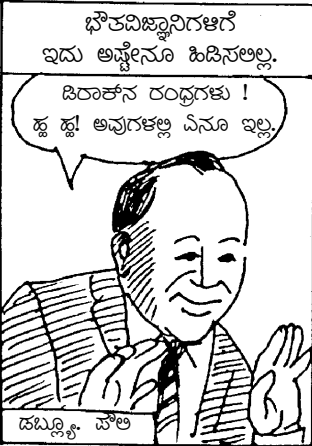
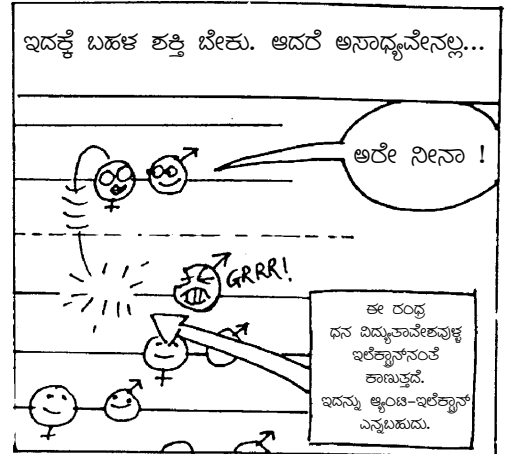
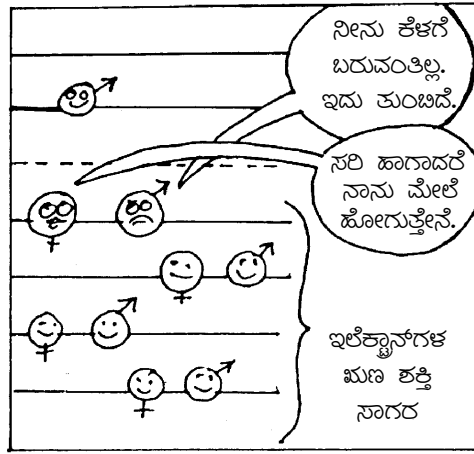
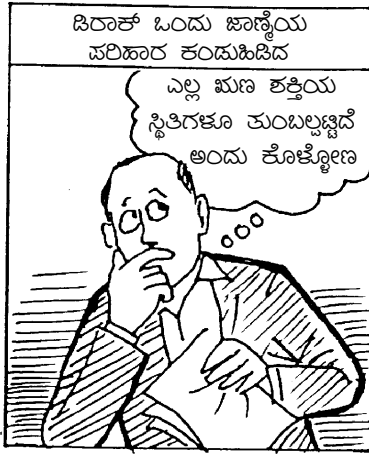
షేలీజ్ తరంగద
అస్థష్ఠ కల్పనేయింద
ఓండు పరిషూణ
తరంగ సిద్ధాంతవన్న
కణ్ణద్దు ఓండు
కనరక్కే సరి

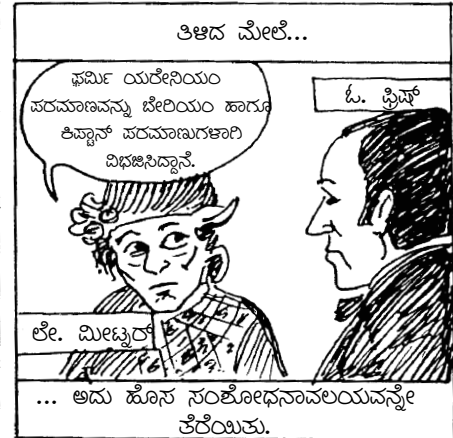
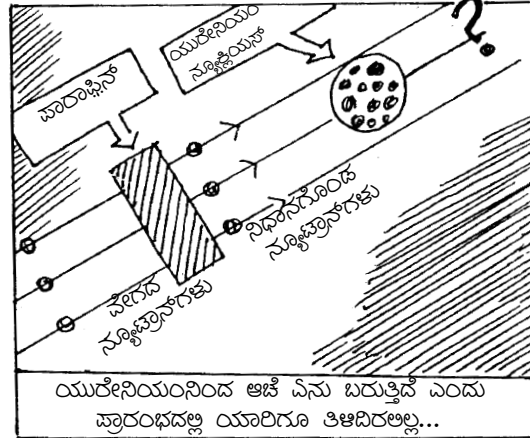
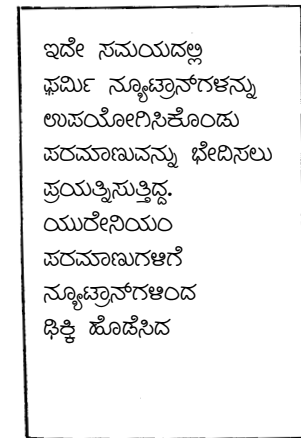
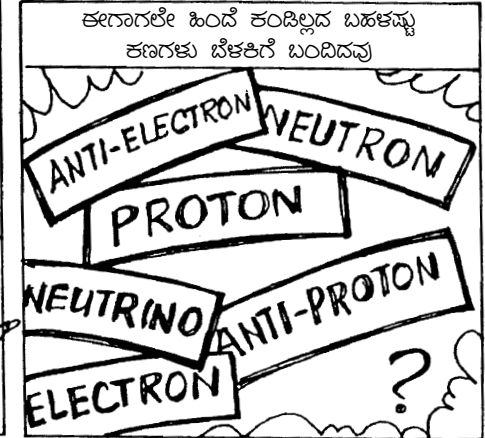
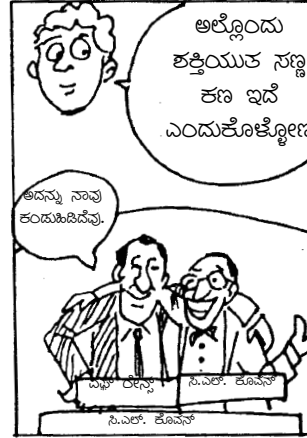
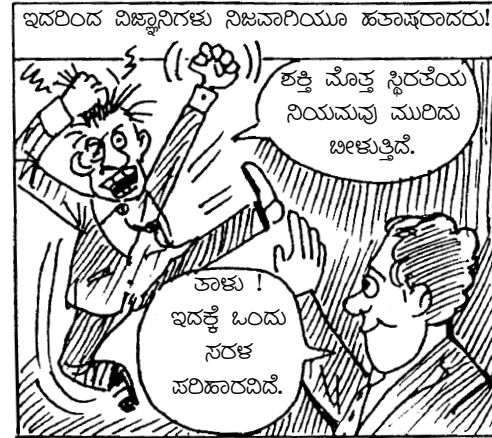
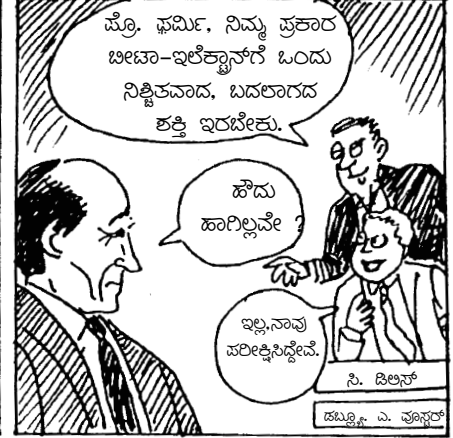
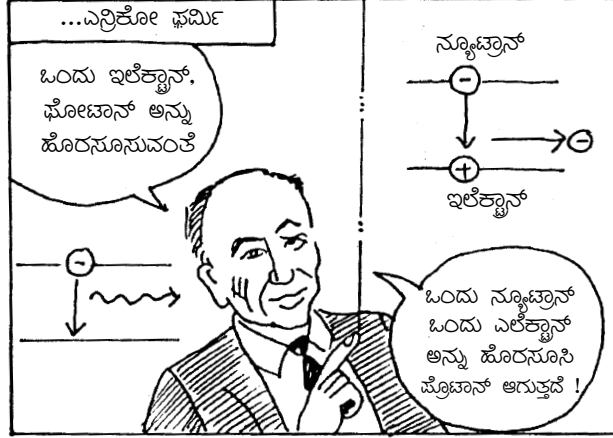
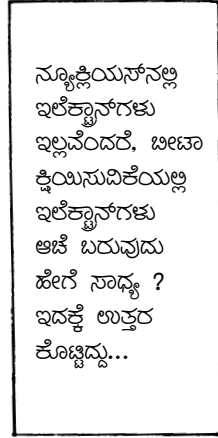
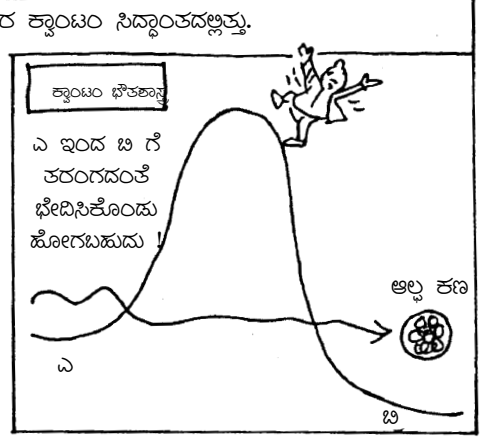
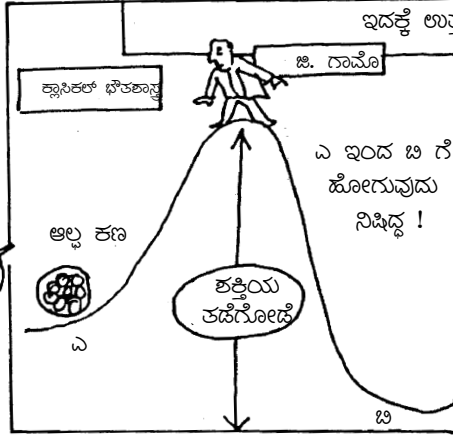


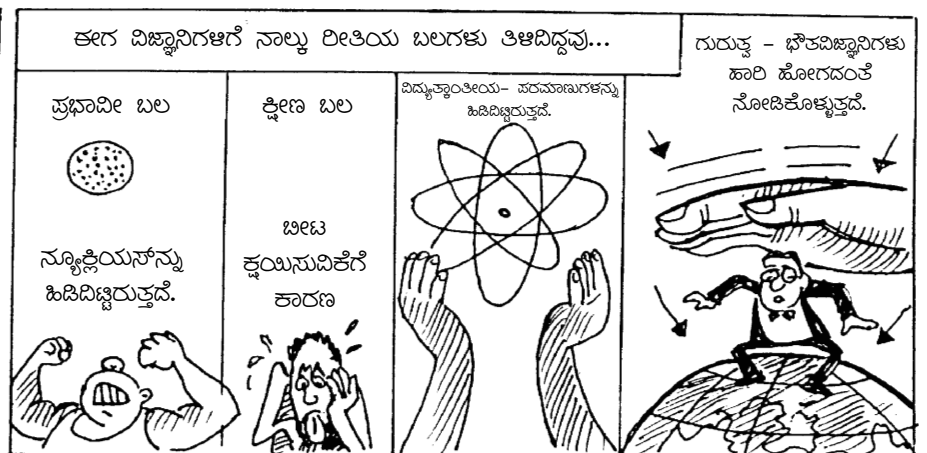
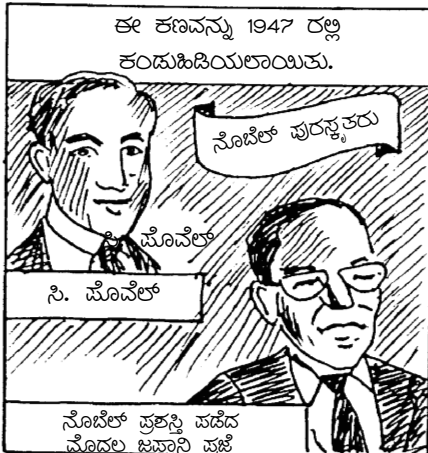
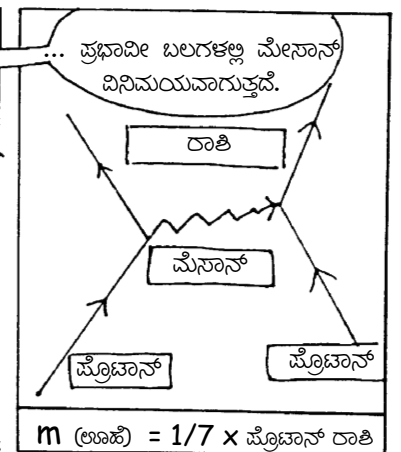
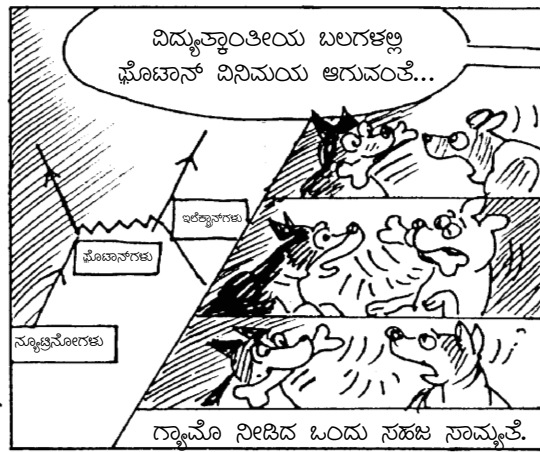
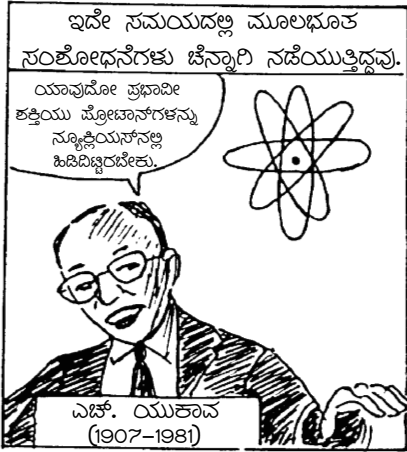
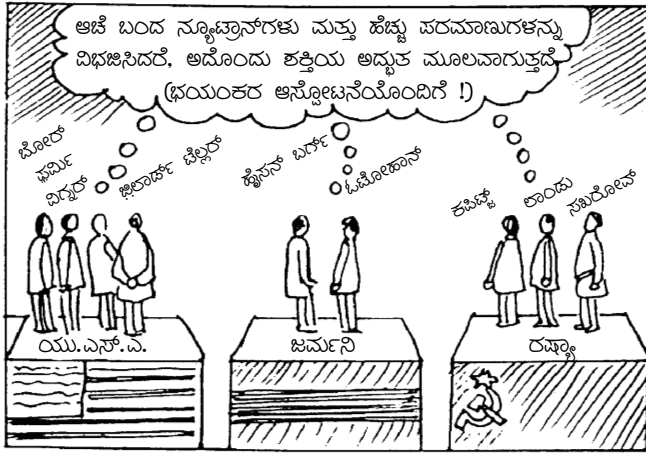
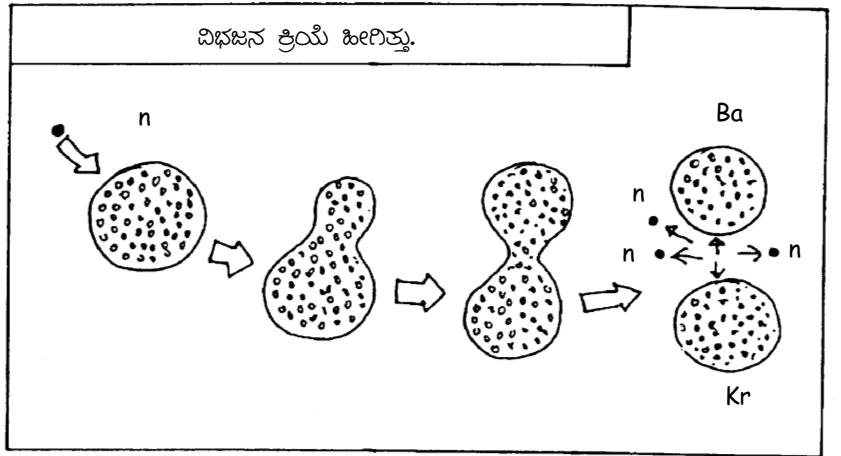
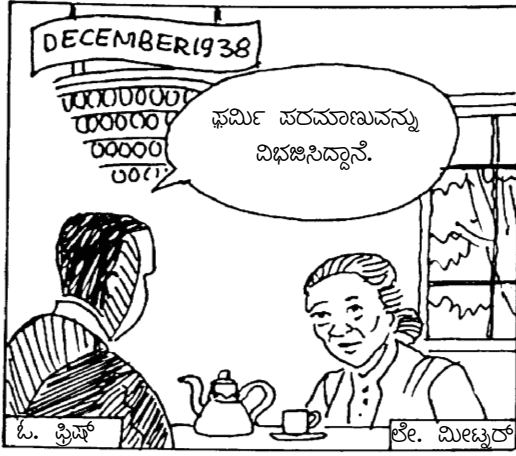


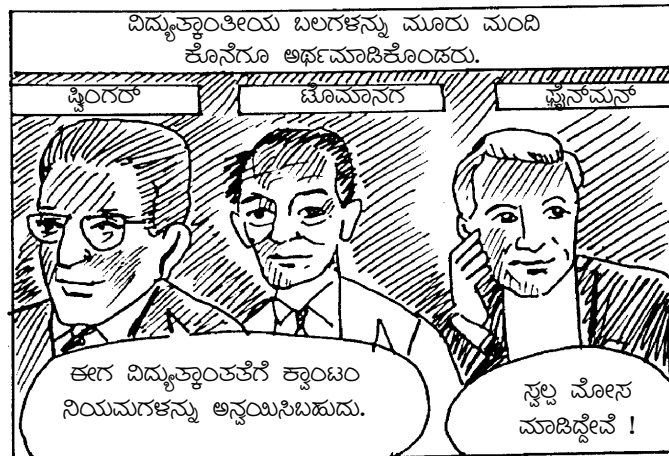
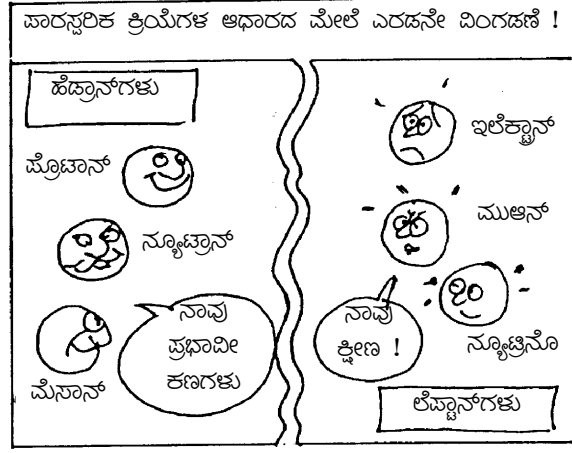
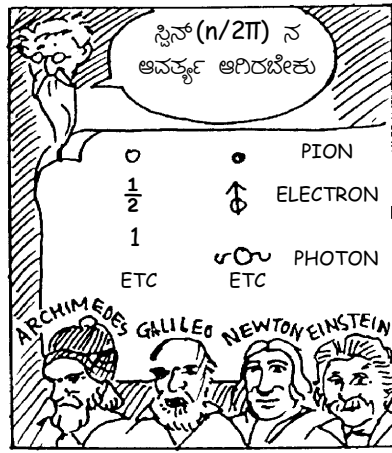
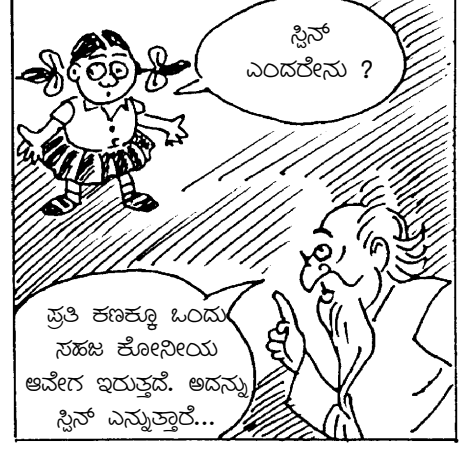
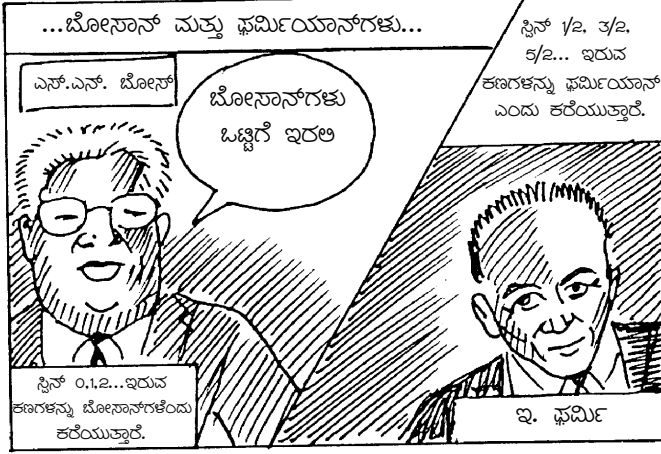
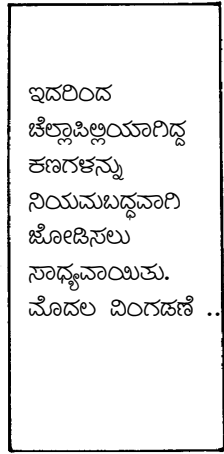
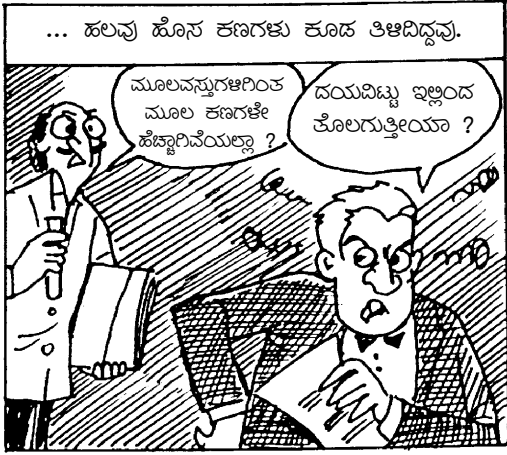
మోదలు క్లాంఘం
అలొలజనగేకు
స్వల్ల విజిత్రవారి కండరూ
నిధనావారి ఓందు
అథమూర్ణ సిద్ధాంతవారి
రూపుగోండితు.
ఇదర మూలభూత
పరికల్పనే
అనిదిశ్శతేయ నియమ.



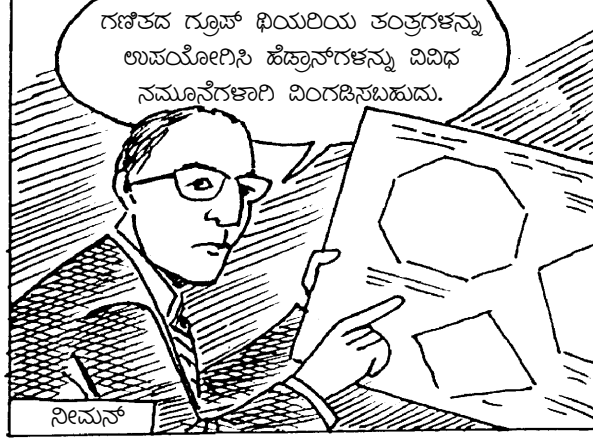




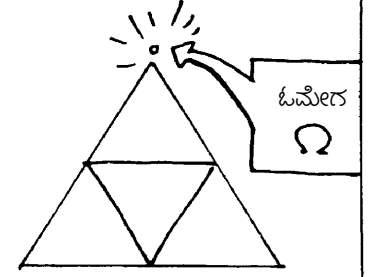




ಹೆಡ್ರಾನ್‌ಗಳನ್ನು
ವಿಂಗಡಿಸುವಲ್ಲಿ
ಮೊದಲ ಹೆಜ್ಜೆ ಇಟ್ಟವರು
ಎಮ್. ಗೆಲ್‌ಮಾನ್
ಮತ್ತು ಫೈ. ನೀಮನ್

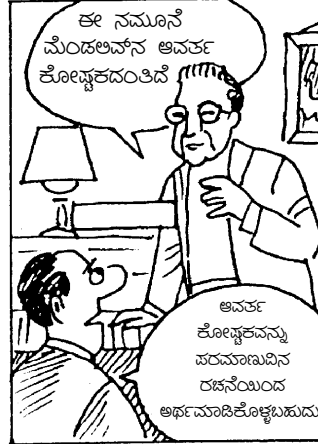
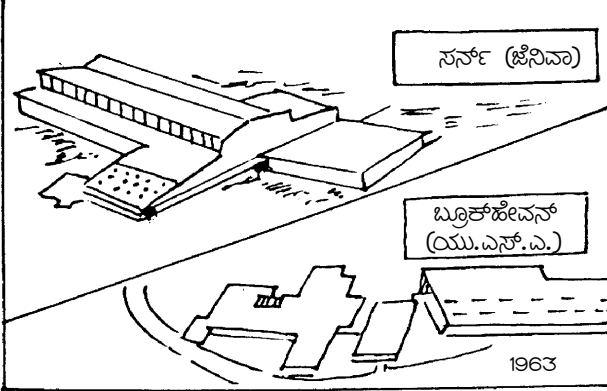


ಈ ರೀತಿ ವಿಂಗಡಿಸಲು ಮತ್ತೊಂದು ಕಠಿಣ ಇರುವಿಕೆ ಅವಶ್ಯವಾಯಿತು...

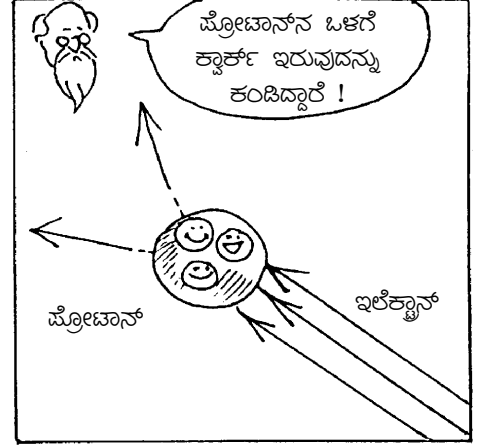
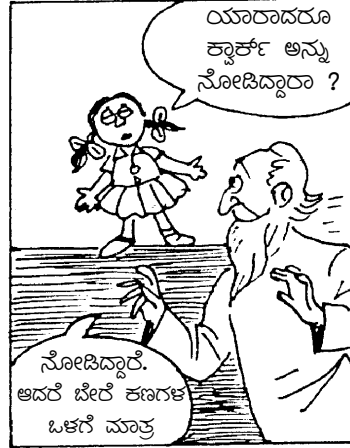
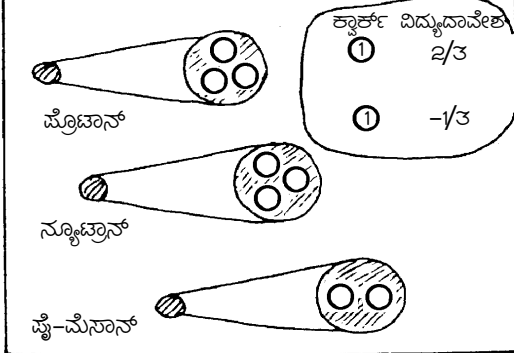


ಕೂಕ : ಪ್ಯೂಟಾನ್ ಕೂಕರಿಂಗ ಒಂದುವರೆ ಪಟ್ಟು ಹೆಜ್ಜು

... ಅದನ್ನು ಸ್ವಲ್ಪ ಸಮಯದಲ್ಲೇ ಕಂಡುಹಿಡಿಯಲಾಯಿತು.

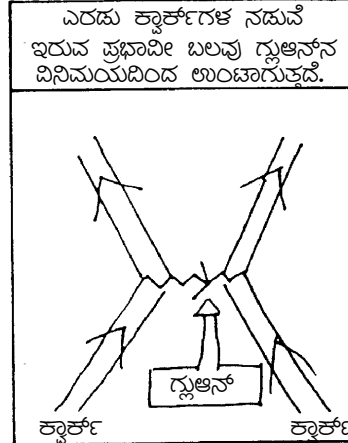


ಹೆಡ್ರಾನ್‌ಗಳು ಅಪ್ ಕ್ವಾರ್ಕ್, ಡೌನ್ ಕ್ವಾರ್ಕ್ ಮತ್ತು ಅವುಗಳ ವಿರುದ್ಧ ಕಣಗಳಿಂದ ಮಾಡಲ್ಪಟ್ಟಿರುವುದರಿಂದ ಗೆಲ್‌ಮಾನ್ ಮತ್ತು ಜೋಸ್ ಲೂಕಿಸಿದರು



ಹೀಗಾಗಿ ವಿಜ್ಞಾನಿಗಳು ಕ್ವಾರ್ಕ್ ಮತ್ತು ಲೆಪ್ಟಾನ್‌ಗಳನ್ನು ಆಳವಾಗಿ ಅಭ್ಯಸಿಸಿಕೊಂಡಿದ್ದರು. ಇವುಗಳಲ್ಲೇ ಮತ್ತು ಹಲವು ಪ್ರಭೇದಗಳಿರುವುದು ಬೆಳಕಿಗೆ ಬಂತು

ಕ್ವಾರ್ಕ್	ಲೆಪ್ಟಾನ್
1. ಅಪ್	1 ಇಲೆಕ್ಟ್ರಾನ್
2. ಡೌನ್	2 ಮ್ಯೂಫಾನ್
3. ಸ್ಟ್ರೇಂಜ್	3 ಟೌ-ಅನ್
4. ಛಾರ್ಮ್	



ಹಲವು ವರ್ಷಗಳ ನಂತರ ಈ ಸಮಸ್ಯೆಯನ್ನು ಬಿಡಿಸಲಾಯಿತು.



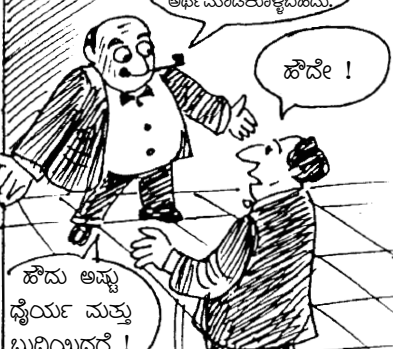
ಎ. ಸಲಾಮ್ ಮೈನ್‌ಬರ್ಗ್

ಇಲೆಕ್ಟ್ರಿಕ್ (ವಿದ್ಯುತ್) ಮತ್ತು ಕ್ಷೀಣಬಲಗಳನ್ನು ಇಲೆಕ್ಟ್ರೋ-ವೀಕ್ ಬಲ ಎಂದು ಒಪ್ಪೂರಿಸಬಹುದು

ಈ ಇಲೆಕ್ಟ್ರಿಕ್-ವೀಕ್ ಮಾದರಿ ಹೊಸ ವಿನಿಮಯ ಕಣಗಳ ಇರುವಿಕೆಯನ್ನು ಊಹಿಸಿತು.



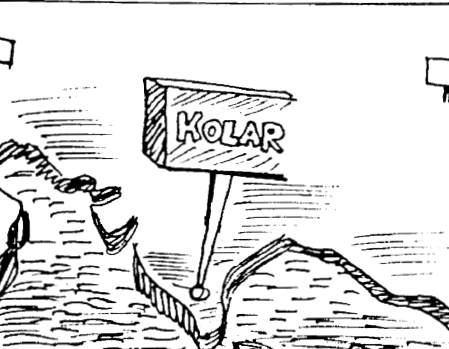
ಇದಾದ ಮೇಲೆ ಭೌತಶಾಸ್ತ್ರದಲ್ಲಿ ಹೇಳಿಕೊಳ್ಳುವಂತಹ ಅಭಿವ್ಯಕ್ತಿಯೇನು ಆಗಿಲ್ಲ. ಪ್ರಕೃತಿಯನ್ನು ಅರ್ಥಮಾಡಿಕೊಳ್ಳಲು ಹಲವಾರು ಪ್ರಯತ್ನಗಳಂತೂ ನಡೆಯುತ್ತಿವೆ.



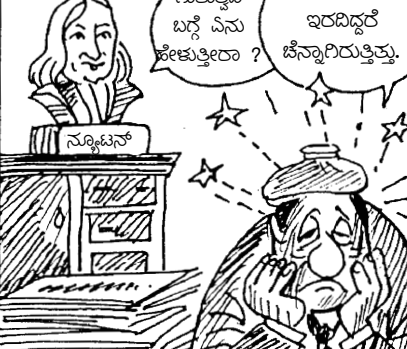
ಭೌತವಿಜ್ಞಾನಿಗಳು ಮತ್ತೊಂದು ಊಹೆ ಮಾಡಿದರು



ಪ್ರಪಂಚದಾದ್ಯಂತ ಪ್ರಯೋಗಗಳು ನಡೆಯುತ್ತಿವೆ. ಆದರೆ ಯಾವುದೂ ಈ ಊಹೆಯನ್ನು ಧೃವಪಡಿಸಿಲ್ಲ



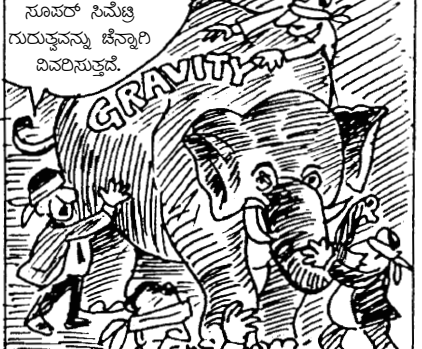
ಇನ್ನೊಂದು ತಲೆನೋವು ಯಾವಾಗಲೂ ಇದ್ದೀದ್ದೇ



ಗುರುತ್ವವನ್ನು ಅರ್ಥ ಮಾಡಿಕೊಳ್ಳುವುದು ವಿರಳತರಗಳಿಂದ ತುಂಬಿರುವ ಒಂದು ಕಥೆ

1980-83

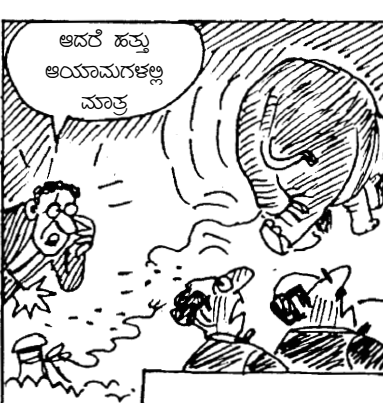
ಸೂಪರ್ ಸಿಮೆಟ್ರಿ ಗುರುತ್ವವನ್ನು ಟೆನ್ಸಾರಿ ವಿವರಿಸುತ್ತದೆ.



ಗುರುತ್ವವು ಸ್ಪಿಂಗೆ ಗಳಿಂದ ಕಟ್ಟಾಕಲ್ಪಟ್ಟಿದೆ



ಆದರೆ ಹತ್ತು ಅಯಾಮಗಳಲ್ಲಿ ಮಾತ್ರ



ನಾವು ಯಾವುದನ್ನು ಪ್ರಾರಂಭ ಎನ್ನುತ್ತೇವೋ ಅದೇ ಕೆಲವೊಮ್ಮೆ ಅಂತ್ಯವಾಗಿರುತ್ತದೆ. ಒಂದು ಅಂತ್ಯವು ಮತ್ತೊಂದಕ್ಕೆ ಅದಿಯೂ ಆಗಬಹುದು. ನಾವು ಎಲ್ಲ ಪ್ರಾರಂಭಿಸಿದವೋ ಅಲ್ಲದೇ ಅಂತ್ಯ.

ನಾವು ಇಲ್ಲದ್ದೇವೆ!

